Legacy Modernization Guide

For Texas State Agencies
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Revision History

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1 Statement of Purpose

1.1 Context

This Legacy Modernization (LM) Guide supports the Texas state government's vision, mission, and House Bill 1890 (84R) 2015, which includes multiple requirements authorizing and supporting LM (Figure 1 below). House Bill 1890 was driven by the statewide need to address the security, reliability, and customer expectation challenges caused by the large number of legacy systems within Texas state government.

Generally, a system is considered legacy when it contains components that are no longer being actively developed and may not yet be fully retired. It is important to note that legacy systems may still have useful capabilities that are vital to the business's ability to deliver value. DIR currently is developing multiple projects to realize this value and the requirements of House Bill 1890. The LM Guide will be supported by other related projects, such as an Application Development Decision Framework (ADDF) and the Application Portfolio Management (APM) enterprise shared solution. DIR is also addressing security issues related to legacy systems through: 1) analysis of Agency Information Security plans; 2) prioritization of agencies' cybersecurity and legacy systems modernization projects (see the PCLS report); and 3) recommendations in the Biennial Performance Report. DIR is facilitating shared solutions, like a business analytics and reporting service, to encourage adoption of data standards and optimal system utilization. Additionally, DIR's *Engagement Model* outlines the support services that are available to all agencies (see Section 1.5.4, Service Deliverables and Expectations of DIR).

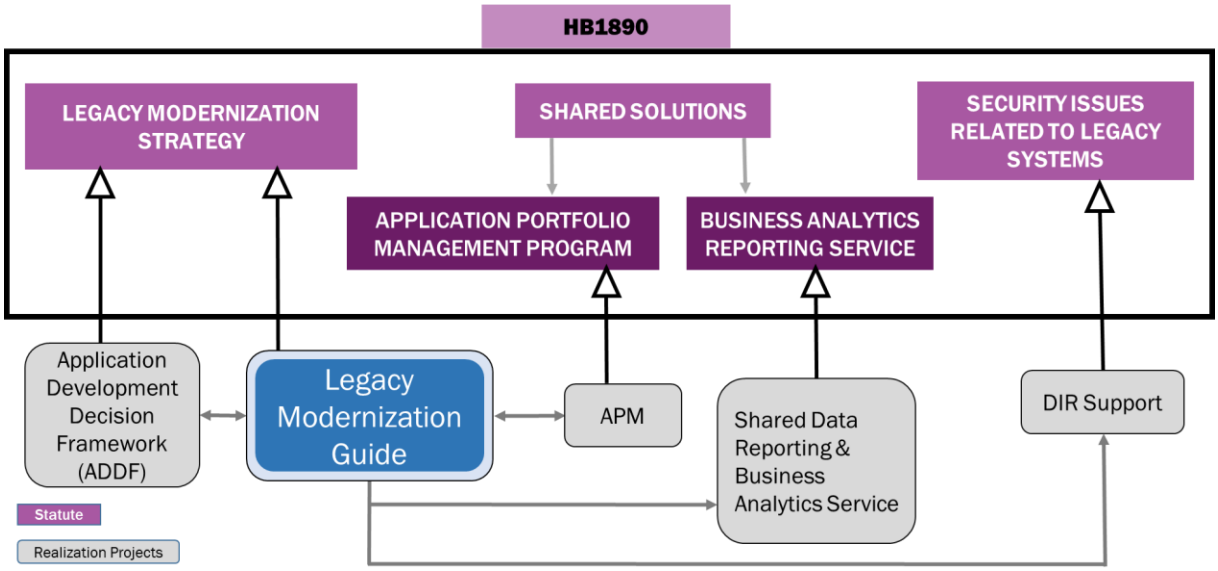


Figure 1 - Context of Legacy Modernization Guide

1.2 Purpose

This Guide provides guidelines, principles, best practices and references for business and information technology professionals who are developing a plan to modernize a legacy environment, including Business Applications (with supporting hardware and software components), so they can modernize in a more efficient, effective, and consistent way. The guide is a living document that will evolve as lessons learned from the community are captured and applied.

1.3 Scope

Generally, an LM project will be completed through multiple stages (i.e. Due Diligence, Planning and Funding, Transformation, and Production) which will be discussed in more detail in Chapter 0 -

Legacy Modernization Guide. This LM Guide focuses on outlining a methodology for completing the first stage: Due Diligence, and the Modernization Planning phase of the Planning & Funding stage. While future versions of the guide may cover additional stages, this version will cover the following:

- The overall LM approach
- The key phases in all primary stages for LM
- The key activities for phases in the Due Diligence stage
- A high-level use case for illustration purposes
- A high-level specification for the next steps agencies should conduct
- Some shared supporting tools and artifacts for LM, which will be an on-going development led by DIR

1.4 Benefits

The Legacy Modernization Strategy provides a comprehensive LM package that agencies can use to conduct, track, and support their LM initiatives. The package includes a series of common artifacts, a common process (LM Guide), and common toolsets, such as the Application Development Decision Framework (ADDF) and Application Portfolio Management (APM). The LM Guide enables a consistent design and a common process that can be acted on and shared across an agency and shared with other agencies that are planning legacy modernizations.

1.4.1 Common Artifacts

The guide includes the templates for the creation of:

- **Business Capability Model**: Categorize changes being made to processes and resources in each capability during the LM Plan, which helps to understand changing business objectives and related application and IT costs.
- **Modernization Strategy Roadmap**: Presents a chronological view of changes over the LM timeline, organized by "epics," "stories," and their prioritization in the Capability Prioritization Assessment. The roadmap will show where you are today and where you need to be in the future to ensure achievement of the right business outcomes.
- **Gap Analysis Template:** Understand and prioritize business needs by identifying deficiencies, or "gaps", which need to be overcome, and identify the work effort required to address them.
- **To-Be Change-Impact Analysis Template:** Identifies the potential consequences of a change and allows for estimating what needs to be modified to accomplish the change.

Additional templates are expected as the guide evolves.

These common artifacts can be used by agencies to quickly start their LM program in a more efficient, effective, and consistent manner.

1.4.2 Common Process

The guide includes an LM Approach, which consists of a series of stages, phases, and activities which allow an agency to plan and execute an LM project successfully.
The common process will enable agencies to execute an LM program with:

- **Increased Confidence**: through utilizing a structured proven approach vs. personal style
- **Reduced Risk**: through leveraging industry expertise to minimize delays and unify various approaches. A well-defined modernization process can reduce risk. A NASCIO survey shows that a major concern of state CIOs is Risk of Migration, and that they wish to cluster agencies to develop common plans to ease integration of modernized applications across agency lines.
- **Improved Return on Investment (ROI)**: through reduced cost overruns by acquiring a greater awareness of potential issues; reduced effort and cost from not having to create or acquire a methodology; reduced learning curves through reuse, cross-agency use, and shared lessons learned.

This guide promotes constructive strategic planning at the initial Due Diligence stage, leveraging data collected during the 2014 Legacy System Study and captured using an Application Inventory Glossary and related processes. At the completion of the Due Diligence stage, business program areas across the agency will have a common 360-degree view of their capabilities from business and technology perspectives, and in current (i.e., As-Is) and target (i.e., To-Be) states. This uniform way of viewing and understanding how business applications, technology, and data structures are changed through the LM will streamline the way the LM is planned and executed, how information is reported, and will enable tools to organize and present progress in meaningful ways.

1.5 Assumptions

1.5.1 General

- This guide is a living document that will evolve through agencies' LM practice.
- Although the guide is initiated by DIR, it will be a collaborative effort incorporating the thoughts, recommendations, and lessons learned shared by all agencies via a to-be-established Legacy Modernization Advisory Council.
- Additional assets (e.g., artifacts, templates) will be developed and added to the guide as needed down-the-road.

1.5.2 Philosophy - Strategy of Agency and DIR in the Guide

The Guide facilitates a structured implementation of tools and practices (many provided by DIR) for the agency's creation of a modernization plan. The Guide addresses the three phases of the Due Diligence stage, and the Modernization Planning phase of the Planning & Funding stage.

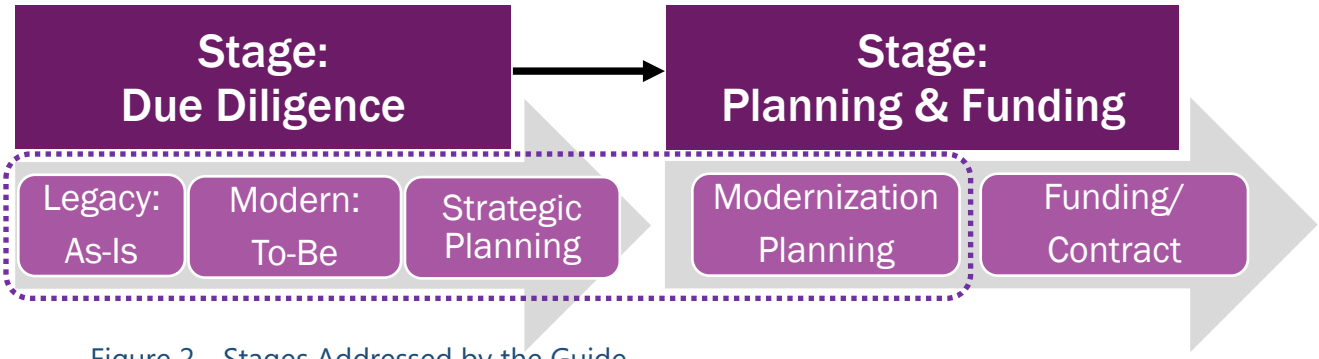


Figure 2 - Stages Addressed by the Guide

Subsequent LM stages (the Transformation and the Production stages) must be addressed by agencies and are not currently developed in the Guide.

1.5.3 Service Deliverables and Expectations of the Agency

This section provides a list of the Modernization related activities to be performed by the various agency team members. The agency Modernization Team will verify proper completion of each.

Agencies to:

- **Initiate**
  - *Structure* - Establish technology and business sponsors, identify contributing team members and subject matter experts.
  - *Organization* - Communicate goals and objectives of the overall effort.
- **Create**
  - *LM Plan* - At an agency level, a plan defining the approach and timeline of migrating legacy systems toward the modernization vision.
  - *Business and IT Architecture Artifacts* - At an agency level, a visual model depicting business critical capabilities, enabling IT system architectures including applications, data and technologies, and high-level inter-dependencies, from both legacy (i.e., As-Is) and modern (i.e., To-Be) perspectives.
- **Communicate**
  - Use the LM Plan to communicate activities, direction, and dependencies within the agency and to external stakeholders.
  - Report to state leadership on LM progress and ADDF usage with resulting artifacts.
- **Collaborate**
  - Leverage DIR resources and tools for support
  - Sharing any lessons learned across agencies
- **Execute**
  - Submit plan for funding and secure the budget
  - Develop an appropriate team to execute the LM plan through transformation and production stages
- **Reference**
  - Application Development Decision Framework (ADDF)
  - Statewide Project Delivery Framework or PM Lite
  - Application Portfolio Management (APM) Tool
  - Enterprise Reference Architecture Framework

1.5.4 Service Deliverables and Expectations of DIR

This section provides an Engagement Model with a list of the Modernization related activities to be performed by the various DIR team members. The DIR Team will verify proper completion of each.

DIR to:

- **Create**
  Currently Available
  - LM Guide
  - LM Artifact Checklist
  - LM Plan Rubric (refer to Appendix 6.8 Legacy Modernization Plan)
  - Business Application Portfolio Model Rubric (refer to Appendix 6.7 Business Application Portfolio Model)
  - Texas Project Delivery Framework
  - LM Compliance Dashboard
    (refer to Appendix 6.5 Legacy Modernization Progress Dashboard)
  - Application Development Decision Framework
  - Application Portfolio Management (APM) service
  - State Strategic Plan (SSP) program
  - Gap Analysis Template
  - Change Impact Analysis Template
  - Training workshops for LM Guide implementation
  - Develop a mechanism to track the effectiveness of these initiatives (TBD)
  - Establish milestones, metrics, and validation of outcomes (TBD)
  - Enterprise Reference Architecture Framework
- **Communicate**
  - LM Strategy and Expectations
  - LM Guide
  - Knowledge Sharing – Lessons Learned
  - Enterprise Architecture Practice
  - DIR Engagement Model
- **Coordinate**
  - Deployment of LM Guide
  - Collection of state-wide business application modernization priorities
  - Analysis of viable COTS solutions based upon common business priorities
- **Collaborate**
  - Support agencies' LM Initiatives
  - Report on LM Compliance
  - Legacy Modernization Advisory Council

2 Overview

This section describes the challenges associated with completing daily operations on legacy systems, and the financial impact of those efforts. It includes a collaborative cross-agency vision for overcoming these challenges and enabling greater agency interoperability. To lend chronological context, a brief history of previous steps and the goal of the program are included. Lastly, this chapter introduces basic information about legacy system concepts, and prerequisite materials and knowledge needed before using the guide.

2.1 Problem Statement

Agencies have an on-going responsibility to operate an efficient and cost-effective state government. Aging systems that are either costly or inefficient in operations, or which simply do not have manufacturer support for the software, need priority attention. Legacy business applications are more difficult and costlier to support, are less resilient, and are likely to carry a higher degree of security risk. Agencies are often unable to supply the staff necessary for growing service demands. There is an increased dependency upon automation to meet those demands. Over time, technical debt accumulates and becomes harder to reconcile. There is limited active portfolio management to guide decision-making for IT investment, or to balance business needs that drive functionality with the demands of maintaining the technology landscape and sustaining business applications.

Agencies find themselves in the "business" of managing technology vs. focusing resources on their core competencies. They support the complex relationship between State Legislature, Taxpayers, Business Resources, other State Agencies, Vendors, and services DIR provides, as shown below. To maintain stable relationships among these entities, it is necessary to consider all of them in the LM Plan.
As the population in Texas continues to grow and businesses prospers, the demand for state-provided services increases. Strategic planning is necessary to ensure these future needs are anticipated and met.

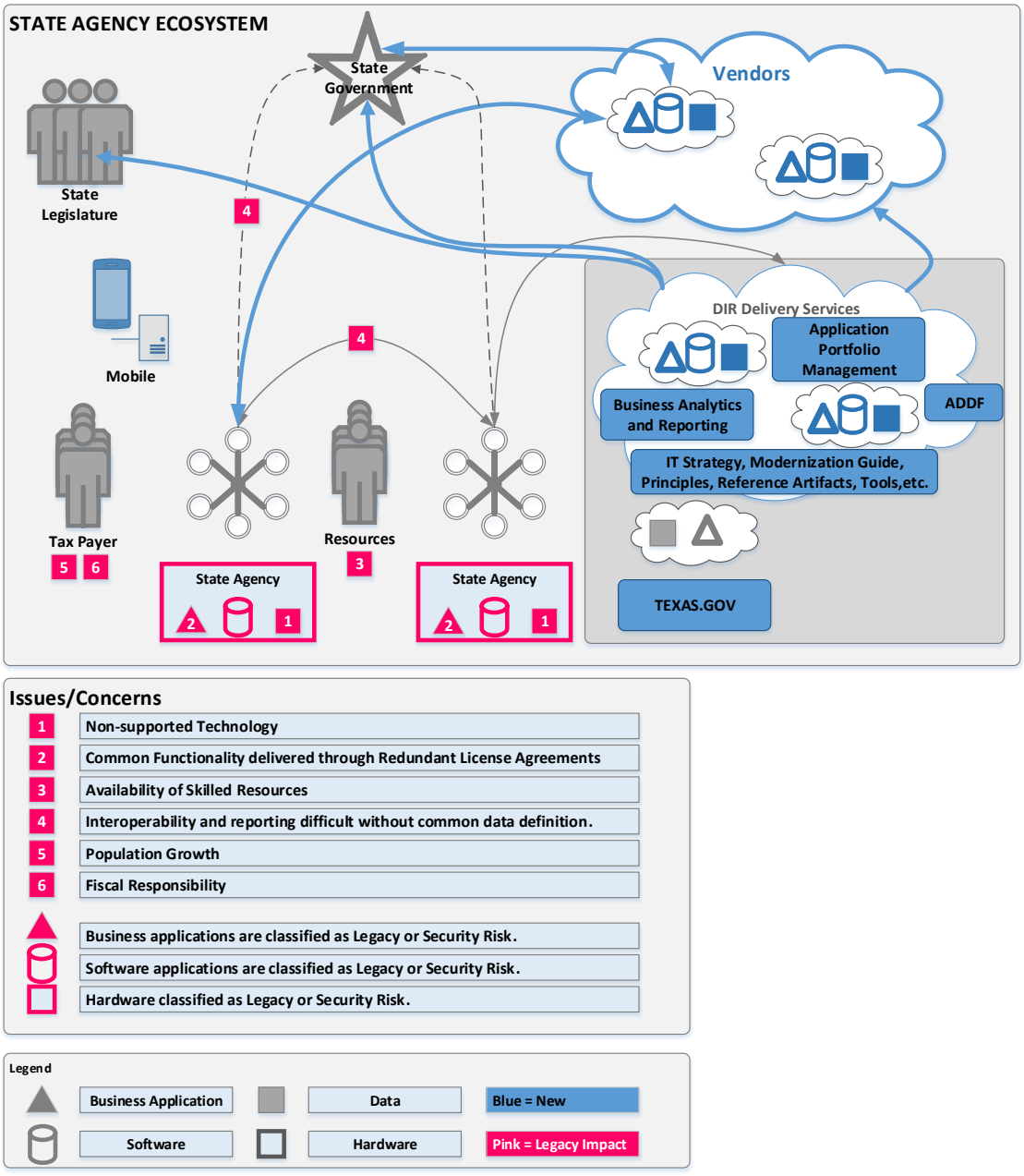


Figure 3 - State Agency Ecosystem

2.2 Legacy Modernization Vision

State Agencies are supported with technology solutions that are functional and secure, through a thoughtful transition toward a modern statewide technology ecosystem. This transition needs to be cost efficient, sustainable, and designed with public service needs and agency interoperability in mind. To truly address the challenges, we should not only modernize technology ecosystems through transition but also lead through constructive enterprise innovation by appropriately utilizing emerging technologies which have strategic impacts on business and people's lives.

The need for modernizing the statewide technology ecosystem introduces the primary objectives of LM. This document provides guidelines for agencies to achieve those objectives and the LM vision. The document will be used to assist an agency's development of their LM Plan to achieve the following:

- **Risk Mitigation**
  Reduce the risk(s) associated with dependency upon legacy applications.
- **Sustainability**
  Availability, and affordability of resources: common tools = common skill sets
- **Cost Efficiency**
  Maximization of the technology investment in terms of business value
- **Public Service**
  Enablement of innovative Interoperable Solutions
- **Preparation for the Future**
  Establish a basis for Information Technology Digitalization

2.3 Legacy Modernization, Due Diligence, and the Guide

This Guide focuses on the first stage of LM: **Due Diligence,** and the modernization planning phase of the **Planning and Funding** stage. The Due Diligence stage has three phases with the following focused activities:

- **Legacy or As-Is Study**
  Review existing technology infrastructure (a point-in-time study was performed by most agencies during the 2014 Legacy Systems Study). Please refer to Application Portfolio Management (APM). In addition, an agency should do As-Is analysis from business, application, data, and technology perspectives. These will be illustrated further in chapter 0.
- **Modern or To-Be Study**
  After understanding the legacy or As-Is status, identify the target modern or To-Be state. Define the target from business, application, data, and technology perspectives. These are illustrated in more detail in chapter 3.

- **Agency-Wide Vision Roadmap**
  Once the current state (As-Is) and target (To-Be) state are established, do a gap analysis to determine the opportunities for improvement via modernization and how to migrate from current to target.

  The vision is the future state that we will be working to attain. Ideally, the vision needs to be clearly articulated in a document and represented by a visual model. At a high level, it can be represented on a single diagram for both As-Is and To-Be states. These result in an all-inclusive, common blueprint of the entire effort.

  The final output of the due diligence stage is to provide a high-level strategic roadmap to transfer the As-Is to the To-Be state from business, application, data, and technology perspectives, with related change management, program management, timeline, and budget considerations. Thoughtful analysis needs to be applied to identify the organizational and technological impacts, some of which may require additional communications, care, and change management planning for things like systems downtime, transportation of equipment, training on new systems, or synchronization with other projects. Keeping a broad perspective helps to define the plan. It is important to capture the entire scope of the impact on system actors within the agency but also outside of the agency. Concise, consistent, and reliable communications to both external and internal audiences can ease the transformation process.

  This high-level strategic roadmap will be the key input for creating a modernization plan in the next stage of Planning & Funding. The plan documents the roadmap in more detail for the journey to transform the agency from the current state to the vision (i.e., To-Be) state.

2.4 Legacy System Basics

2.4.1 Defining "Legacy"

Specifically, a legacy system is any system that meets at least one of the criteria of obsolete or inefficient hardware or software technology:

- **Obsolete** -- any hardware or software technology that is:
  - no longer supported by the manufacturer or third-party vendor community
  - no longer able to provide or perform future system improvements or corrections
  - currently associated with premium or exceptional support charges from the manufacturer or vendor community for support, or

    - lacking the qualified pool of support knowledge, viable spare parts, or commercially viable channels for acquiring necessary skills to continue operations with a reasonable degree of certainty.
- **Inefficient** -- any hardware or software technology that does not meet the processing and functioning standards that are modern or efficient in the current local market.

Generally, a legacy product is no longer being actively developed and may not yet be fully retired. These products have reduced support (their emerging bugs and defects left unfixed) due to their age and lack of integration with current modern products. It is important to note that legacy products may still have useful capabilities that are vital to the business's ability to deliver value. Refer to the House Bill 2738 directive for agencies to perform a Legacy Systems study, and the resulting public Legacy Systems Study report provided by DIR.

2.4.2 Legacy Status

This guide defines actions taken on Business Applications during the LM Plan. We refer to a Business Application as the high-level label used by an agency business and IT organization to easily identify a group of functions provided by one or more systems to accomplish the specific business needs of the agency. A Business Application is typically a combination of integrated hardware and software (including data and applications), internally developed custom systems, commercial off the shelf (COTS) applications, and/or customized third-party systems.

The actions taken on these Business Applications fall into the following high-level categories (identified as TIME in the Legacy Systems Study and the ADDF):

- Tolerate
- Invest/Innovate/Integrate
- Migrate/Modernize
- Eliminate

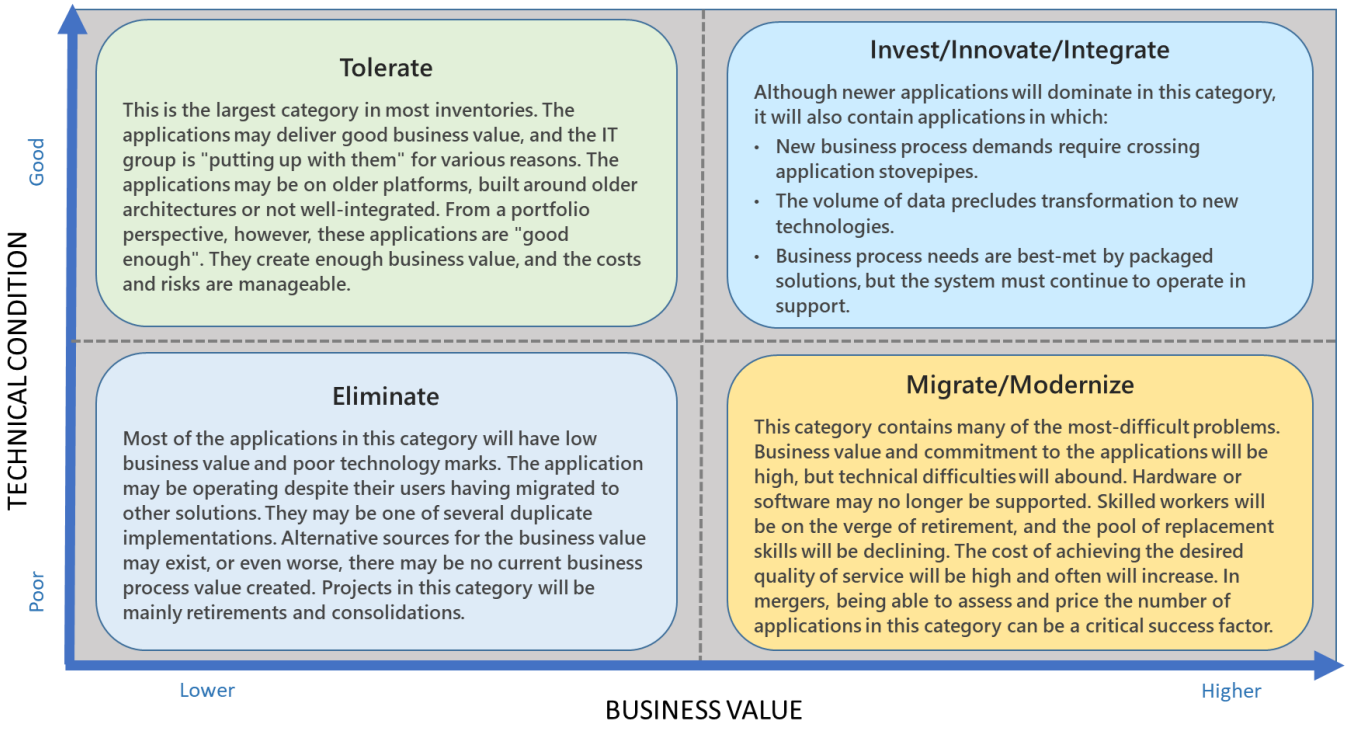


Figure 4 - Business Application Status

There are four alternative types of actions used to categorize a legacy business application.

1. **Tolerate**
   These systems continue to create sufficient business value, and their risks and costs are manageable. These systems can continue to exist As-Is, but it is not worth the investment to significantly enhance or increase the business dependency on these systems.
2. **Invest/Innovate/Integrate**
   Not only are the risks and costs of these systems manageable, but they also provide high business value. These systems are worth investing in their on-going use.
3. **Migrate/Modernize**
   Systems in this category provide high business value, but the expense and risks involved in maintaining these systems are so high that migrating to a modern architecture is the best alternative.
4. **Eliminate**
   These applications have little current value to the business, and their risks and cost are high. Most of the functionality is available via other systems. These applications should be retired or consolidated.

Which of these actions is most appropriate for a specific product depends on the quality of the current legacy product, its value in the future modernized system, the relative cost

to maintain, and how well it can continue to serve its functions in the future agency technology and business ecosystem.

2.5 Prerequisite Materials and Knowledge

This section lists some of the materials and knowledge an agency may use to prepare for the creation of their LM Plan.

2.5.1 Application Inventory Glossary

An Application Inventory Glossary *(e.g., an* Application Portfolio Management (APM) *solution)* provides a single common reference for agency staff to identify the key attributes of a business application or system. The Glossary identifies the business application by a common name and a more complete description of its purpose. The Glossary includes the acronym along with the related "common" name that could be found on a public web site. Additional attributes that may be included are:

- Vendor Name
- Module
- Software Version #
- Primary Audience (internal, external, 3rd party)
- Application Owner (name, contact info)
- Legacy Product Disposition (Tolerate, Invest/Innovate/Integrate, Migrate/Modernize, Eliminate)

2.5.2 Business Events Calendar

The Business Events Calendar is a collection of dates that are critical to the business side of the agency. The Technology team can use this calendar to plan system User Acceptance Test, sprint deployments, and Minimum Viable Product (MVP) releases.

2.5.3 Technology Events Calendar

The Technology Events Calendar is a collection of dates that are critical to the technology side of the agency. The Business team can use this calendar to plan system User Acceptance Tests, sprint deployments, and MVP releases.

2.5.4 Enterprise Calendar

The Enterprise Events Calendar is a collection of dates that are critical to both the business and technology teams. A single calendar of critical events shared by all parties helps to ensure common understanding and cadence.

2.5.5 Agency Roles and Responsibility Matrix

The Agency Roles and Responsibilities Matrix presents members of the business responsible for specific domains and value generation. An example matrix is provided in

the Appendix 6.1 Example Responsibility Matrix. Completing this chart will enable a clear line of communication when problems arise.

2.5.6 Application Development Decision Framework (ADDF)

ADDF Provides the DIR preferred structure that guides agencies through the key factors for choosing application development methodologies. An agency will need these methods identified to create its LM Plan and execute LM transformation.

The ADDF provides decision models, best practices, and guidelines of the State of Texas. It is structured to address six areas: business outcomes, development approach, financial model, technology direction, process improvement, and organizational culture and change. Its purpose includes:

- Provide agencies a matrix of choices that guide application development decision-making based on broad and deep criteria.
- Support new solutions and remediation of legacy systems.
- Direct agencies toward justifiable, informed decisions about application development approaches.
- Support documentation of those decisions, using a common vocabulary.
- Provide standard templates, where possible, to use for application development activities, such as a business case for moving an application to the cloud vs. host on premise, regression testing use case, defect template, standardized definitions such as enhancement vs. maintenance, and application ownership cost/benefit methodology.
- Facilitate communication to the Quality Assurance Team (QAT).
- Enhance multi-agency collaboration by establishing a common point of reference and terminology.

Access to the ADDF may be requested via the online form at ADDF Registration (texas.gov).

2.5.7 Agile Terminology: Backlog, Agile, and Stories

The terms "Backlog" and "Agile" are leveraged from a project management style called Agile Methodology. A detailed description of Agile and its popular implementation, Scrum, can be found at https://www.atlassian.com/agile. The definitions below are from a popular Agile planning resource: Atlassian JIRA.

- **Backlog**
  A product backlog is a high-level list of customer requirements for the project that is owned by the product owner or manager.
- **Epics**

An epic captures a large body of work. It is essentially a large user story that can be broken down into smaller stories. It may take several sprints to complete an epic.

- **Stories**
  A story or user story is a software system requirement that is expressed in a few short sentences from a user's perspective, ideally using non-technical language.
- **Sprints**
  A sprint is a regular, repeatable work cycle in agile methodology during which work is completed and made ready for review.

2.5.8 Artifact Design Levels

There is a certain way to communicate a "detail level" for an architecture design. A detail level for an artifact is always relative. There is typically a more detailed view than the current detail level being addressed by the designer. The architect or designer chooses a detail level based on the context, the audience, the purpose, and the architect or designer's experience.

The following is a common way to communicate the detail level of an architecture design. An architect should adjust it to fit in their context or purpose when applying it.

- **Level 0:** Conceptual and overview Level. The general targeted audience is executives and below.
- **Level 1:** Package level (e.g., package diagram). The general targeted audience is managers, and below.
- **Level 2:** Component level. The general targeted audience is architect, technical lead, development lead and below.
- **Level 3:** Class level. The general targeted audience is development lead and developers.

3 Legacy Modernization Guide

This section presents a structured approach to develop a strategy for modernizing technology systems that are essential to an agency's operation. It may also include changes to related aspects of the agency's business model. It is provided as a guide for an agency to create its LM Plan.

3.1 Legacy Modernization Guide Overview

3.1.1 Goals

The Guide:

1. Defines the desired outcomes or deliverables of the Due Diligence Stage.
2. Presents a proposed end-to-end staged and phased approach.
3. Highlights specific points in the process where it includes DIR Support Services such as APM and ADDF.
4. Helps an agency develop an LM plan in a more efficient and effective way through utilizing some common best practices, principles, templates, and artifacts.

3.1.2 Legacy Modernization Approach Overview

The overall LM approach contains the following four stages, each of which includes multiple phases of activities to constructively create outcomes needed for the next stage. Figure 5 shows an overview of the LM Approach at Level 0 detail.

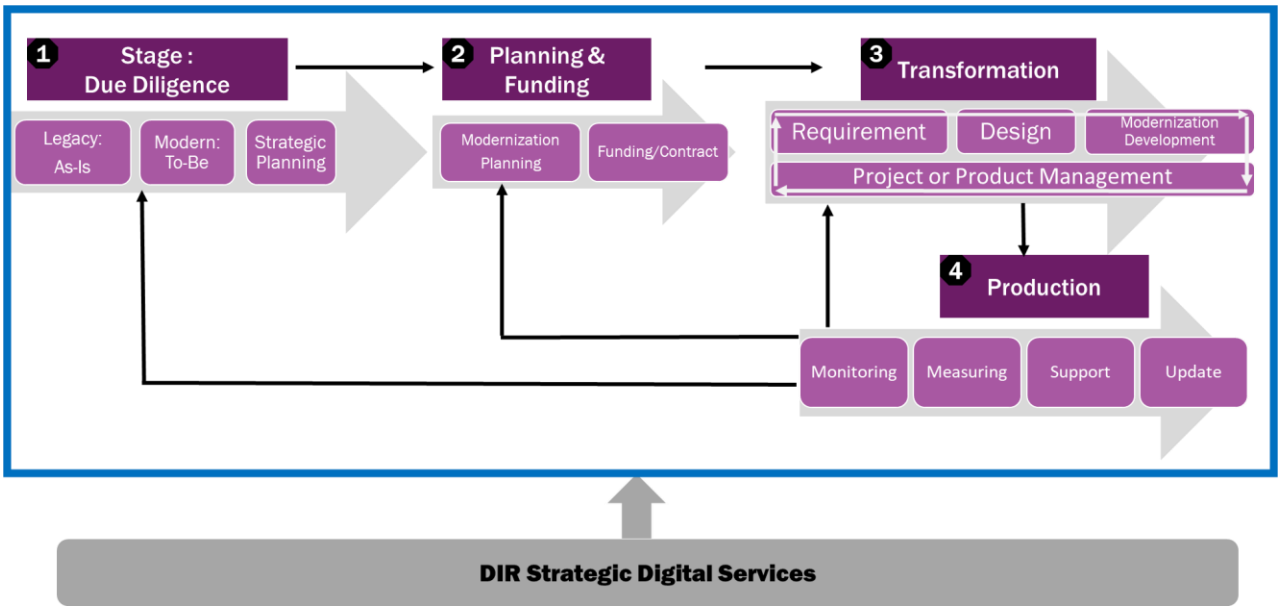


Figure 5 - Legacy Modernization Approach Overview (Level 0)

- **Stage 1: Due Diligence**, including three major phases:
  - Legacy or As-Is, in which an agency will collect and analyze legacy or As-Is information from business, application, data, and technology perspectives providing the agency an appropriate 360-degree view of the "legacy" status.
  - Modern or To-Be, in which an agency will analyze and decide target architectures from business, application, data, and technology perspectives providing the agency an appropriate 360-degree view about where they want to go.
  - Strategic Planning, in which an agency will do gap and opportunity analysis based on the results of As-Is and To-Be analysis completed in the previous phases. This enables the agency to create a high-level roadmap from the "As-Is" to the "To-Be" state. The roadmap and initial high-level plan will be the key input for the next stage (Planning and Funding).
- **Stage 2: Planning and Funding**, including two phases:
  - Modernization Planning, in which an agency will use the LM Roadmap created in the previous stage, and some detailed information collected around business, application, data, technology, people resource, constraints, etc. to create a timeline of execution with sufficient detail to support a funding request and making an informed decision.
  - Funding and Contract, in which the agency's financial, business, and technology teams will partner with the legislative process to decide and plan a funding budget structure to support the LM plan created in the previous phase.
- **Stage 3: Transformation**
  This stage includes three phases: detailed requirement analysis, solution design from business, application, data, and technology perspectives, and LM development. It also includes program and project management across the phases. It is recommended that this stage be executed in an agile way through multiple releases, each of which includes multiple iterations.
- **Stage 4: Production**
  This stage includes monitoring, measuring, support and update. During this stage an agency will measure the performance of the environment and communicate with stakeholders about whether the LM achieves the planned objectives.

  LM is a living process as Figure 5 - Legacy Modernization Approach Overview (Level 0) above shows. In practice, the LM iteration could happen inside stage 3 itself, between stage 3 and 4, from stages 2 to 3 to 4 (then to 2 again), and even across all four stages, each of which could have a different iteration pace.

In the Due Diligence stage, the As-Is and To-Be study for the Business Architecture analysis and development includes the following visual models:

1. **Business Model Canvas**
   Provides a high-level comprehensive view of the values, structures, and activities within a business. It will help an agency to identify high-level key activities and actors in the business. (Refer to detail in Business Model Canvas)
2. **Business Capability Model**
   A business capability is an ability or capacity that a business possesses to achieve a specific purpose or outcome. A business capability is implemented with a set of business processes, which are supported by various business applications or systems. Business capability modeling is a technique for representing an organization's business anchor model. (Refer to detail in 3.3.2.1.7 Business Capability Analysis)
3. **Business Process Analysis**
   Business processes describe how the business performs, or implements, the given capability, and how capabilities connect to deliver a desired outcome. This analysis lists processes and resources necessary to implement the business processes. (Refer to detail in 3.3.2.1.8 Business Process Analysis)
4. **Business Domain Model**
   Provides a form of Entity-Relationship Diagram which offers general scope to how information is used in the business and the rules the business applies in relation to that information. It will help an agency to identify major business entities and their relationships consumed by business activities and actors. (Refer to detail in Business Domain Model)

At the Strategic Planning phase of the Due Diligence stage, besides As-Is and To-Be gap analysis, an agency should conduct the following steps to develop an LM Strategic Roadmap:

1. **Capability Prioritization Assessment**
   Identify the priority of each capability to be addressed by the LM. This is done through reviewing, analyzing, and grading each capability based on its dependencies, complexity, risk, and reward.
2. **Modernization Plan Diagram**
   Presents a chronological view of changes over the LM timeline. It may be organized with multiple views. One is a capability view, which may show "epics" and "stories" along with the capability priority, which is based on the prioritization in the Capability Prioritization Assessment.

Each of these activities is **cumulative**: information gathered is used in subsequent activities. The goal of the Modernization Plan diagrams is to document the business and technology perspectives of the modernization. The focus of the diagrams is to define **business and technology architectures**, i.e., a blueprint of the enterprise that provides a unified understanding of the organization, its business model, and the associated

supporting technology systems.

3.1.3 Audience

The LM Guide caters to several levels of an organization. They include:

- The agency itself for management and control of the modernization effort.
- Members of the legislature for review and planning of funding.
- Members of DIR for identification of opportunities for: functional service consolidation, cross-agency interoperability, coordination, business-IT alignment, potential new business models or processes, or innovation through utilizing solid emerging technologies.

3.1.4 Scope

This guide currently focuses on the phases of the Due Diligence stage and the modernization planning phase of the Planning and Funding stage. It will provide the following key guidelines:

- LM approach
- Key activities for phases in the Due Diligence stage such as, As-Is Analysis, To-Be Analysis, and Strategic Planning. Strategic Planning includes Impact Analysis, Gap and Opportunity Analysis, Strategic Roadmap, and an initial Modernization Plan. The Strategic Roadmap and initial Modernization Plan account for the impact or effects on the entire agency ecosystem:
    - Internal Audiences and Organizational Transformation
    - External Audiences and Community Outreach
    - Business Architecture
    - Technology Service Enablement
        - Application Architecture
        - Data Architecture
        - Technology Architecture
- High level specification for the next steps agencies should conduct.
- High level use case for illustration purposes.
- Some shared supporting tools and artifacts for LM, which will be an on-going development led by DIR.

3.1.5 Outcomes

The LM Guide and its associated deliverables will provide the following across agencies:

- **Process Consistency**
  Both within and across agencies there will be a uniform methodology for addressing approach, terminology, scheduling, and risk assessment in an LM program, and following a systematic process can help ensure predictable, high-quality results.
- **Shared and Reusable Business Capabilities**

It will facilitate and support development of reusable business capabilities and artifacts, which can be shared across agencies or within an agency, and leveraged for future use, thus reducing costs, and expediting the modernization process.

- **Shared Technology Capabilities**
  It will facilitate and support development of reusable technical capabilities and artifacts in application, data, and technology which can be shared across agencies or within an agency.
- **Service Delivery in the Cloud**
  It will justify and promote service delivery in the cloud which can be easily shared and reused across agencies or within an agency.
- **Fiscal Responsibility**
  It will enable and support agencies' achievement of business objectives and value through business-IT aligned LM development that is driven by enterprise architecture practices.

3.1.6 Key Success Factors (KSF)

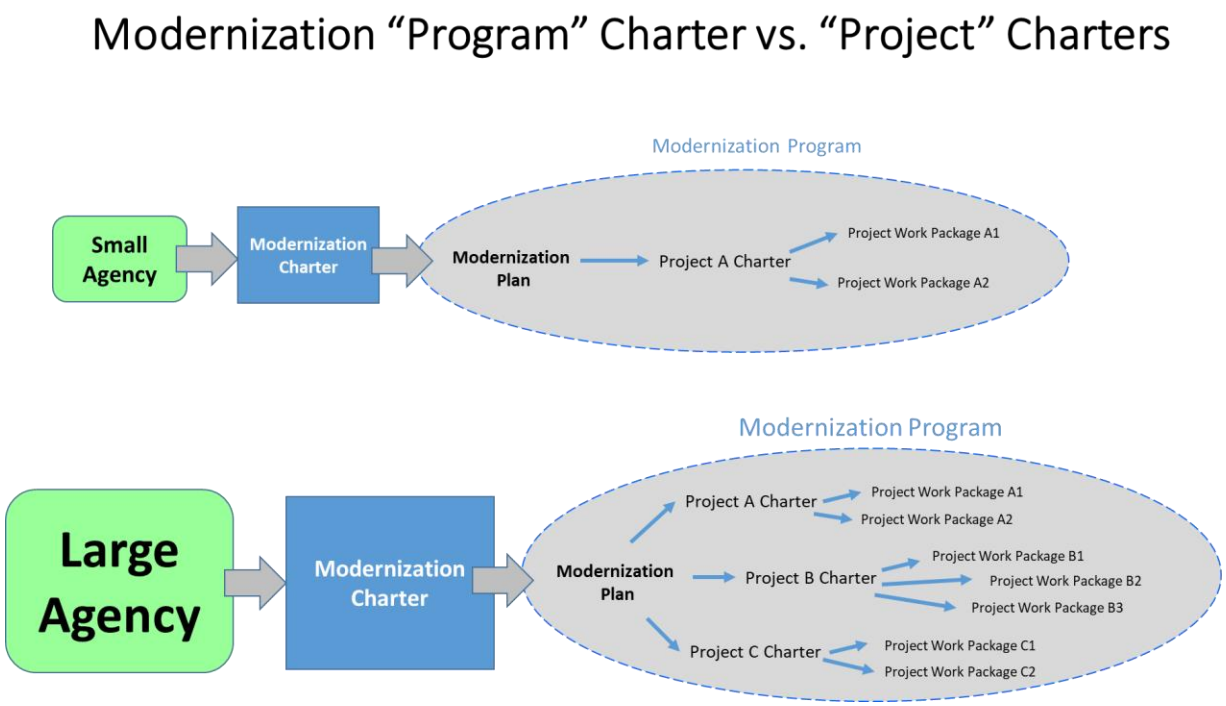
Although there are some different KSF for different LM approaches, here are some common KSF for effective LM.

- Migration Strategy
  - Secure leadership commitment
  - Be agile and incremental
  - Develop a system integration and migration strategy early
  - Ensure IT-Business alignment
- Migration Organization, Operation, and Management
  - Measure and report ROI
  - Garner stakeholders buy-in through involvement
  - Be flexible, Be Agile
    - Modernization transformation through multi-release, multi-phase, and multi-iteration
    - Failure tolerance, but for little, small, and earlier failures
    - Learn and adjust quick from failure and success
  - Solid governance
    - Governing body to ensure all new applications, solutions, data structure, and business models are tied to common goals, roadmaps, and standards
  - Long term commitment of key resources
- Migration Technology
  - Utilize stable or solid modern and emerging technologies
  - Business-oriented view on applying emerging technologies

- Balanced trade-off and reconciled solution among business, application, information, and technology architectures

3.2 Legacy Modernization Charter

The LM "program" should have an LM Charter to specify the program's objectives (3.2.1), scope (3.2.2), deliverables (3.2.3), and participant roles (3.2.4). The LM Charter outlines the executive vision, program objectives, identifies the main stakeholders, and provides a preliminary delineation of roles and responsibilities, including defining the authority of the Modernization Planning Manager (MPM) role. A charter serves as a reference of authority for the future of the agency's LM program. The LM Charter is the overarching charter that precedes the initiation of one or more modernization projects, i.e., each modernization project will have its own project charter. Figure 6 below shows the relationship between the LM Charter and one or more project charters within a Modernization Plan. The LM Charter authorizes the Modernization Program with an emphasis on conducting the LM Due Diligence and Planning & Funding stages. A "Project" Charter will authorize a modernization project that has been targeted by the Modernization Program. A modernization "project" will be associated with the LM Transformation and Production stages.



3.2.1 Modernization Purpose and Objectives

The LM Vision and Goals (refer to section 2.2 - Legacy Modernization Vision) are the primary drivers for the agency Modernization program team. The purpose of the LM

Figure 6 - Modernization Charter vs. Project Charters

program is to ensure that the agency Business Applications can provide reliable, sustainable, flexible, and cost-effective service to the business user and taxpayer with accurate results that are:

- produced in a timely fashion,
- protected from security threats,
- compliant with internal procedures and external regulators, and
- supportable by the agency's Support Team.

A common way to articulate and communicate the purpose and objectives of LM is to develop an Architecture Vision for the program.

- The LM Architecture Vision is a high-level aspirational vision of the capabilities and business value to be delivered through the proposed transformation to modern technology. It describes how the new capability will meet the business goals and strategic objectives and address the stakeholder concerns when implemented.
- The LM Architecture Vision will help obtain agreement and approval for a statement of work that defines an implementation program for the LM effort.
- The LM Architecture Vision provides the sponsor with a key tool to communicate the benefits of the proposed capability to stakeholders and decision-makers within an enterprise or organization.

3.2.2 Modernization Scope and Business Applications

To achieve the LM Objectives, the following key activities will need to occur:

- Process Consistency (refer to ADDF)
- Program Management (refer to Texas Project Delivery Framework and PM Lite 2.0)
- Business Application and Database Rationalization (refer to Application Portfolio Management (APM))
- Identification and Analysis of shared and reusable Business Architecture (e.g., Business Process, Capabilities) from As-Is, To-Be, gap, and opportunity perspectives
- Identification and Analysis of shared and reusable application, data, technology architectures and capabilities from As-Is, To-Be, gap and opportunity perspectives
- Identification, Analysis, and Development of Roadmap and Plan for migrating and transforming from As-Is to To-Be states, including the following perspectives:
    - Business Architecture
    - Application Architecture
    - Data Architecture
    - Technology Architecture
- Design, Development, and Implementation phases for accomplishing LM transformation from As-Is to To-Be states.
- On-going support of the achieved To-Be state through the LM program.
- Constructive system retirement to ensure business continuity.

The Modernization Planning effort shall include the Business Applications which have been identified in the Application Portfolio Management (APM) system and by the Legacy Systems Study.

3.2.3 Deliverables: Legacy Modernization Plan

Besides other deliverables that should be mentioned in an LM charter (e.g., budgeting plan, new system design and implementation), at an agency level, an LM roadmap plan is key. The roadmap plan includes the information for defining the approach and timeline of migrating legacy systems toward the modernization vision. The roadmap plan created at the Due Diligence Stage should include:

- **Business Applications Roadmap**
  A combination of applications and hardware components aligning with their enabled business capabilities, and the phases and timing to achieve their modernization.
  - Roadmap for transferring data architecture from As-Is to a To-Be state
  - Roadmap for transferring application architecture from As-Is to a To-Be state
  - Roadmap for transferring technology architecture from As-Is to a To-Be state
- **Operational and Organizational Transformation**
  - Roadmap for transferring business architecture (strategies/capabilities/process) from As-Is to a To-Be state
  - Other related activities, milestones, and agency-wide events
- **Communication**
  Planning for internal and external communication that needs to occur for modernization to be successful, such as informing customers of temporary outages or system retirement.
- **Risk & Mitigation**
  A list of risks for the LM and the potential mitigation approaches.

3.2.4 Modernization RACI

The LM charter should clearly define roles and responsibilities for the LM program or project. One common best practice is to define them in a Responsible-Accountable-Consulted-Informed (RACI) diagram. See RACI sample in Figure 7 - RACI Example below.

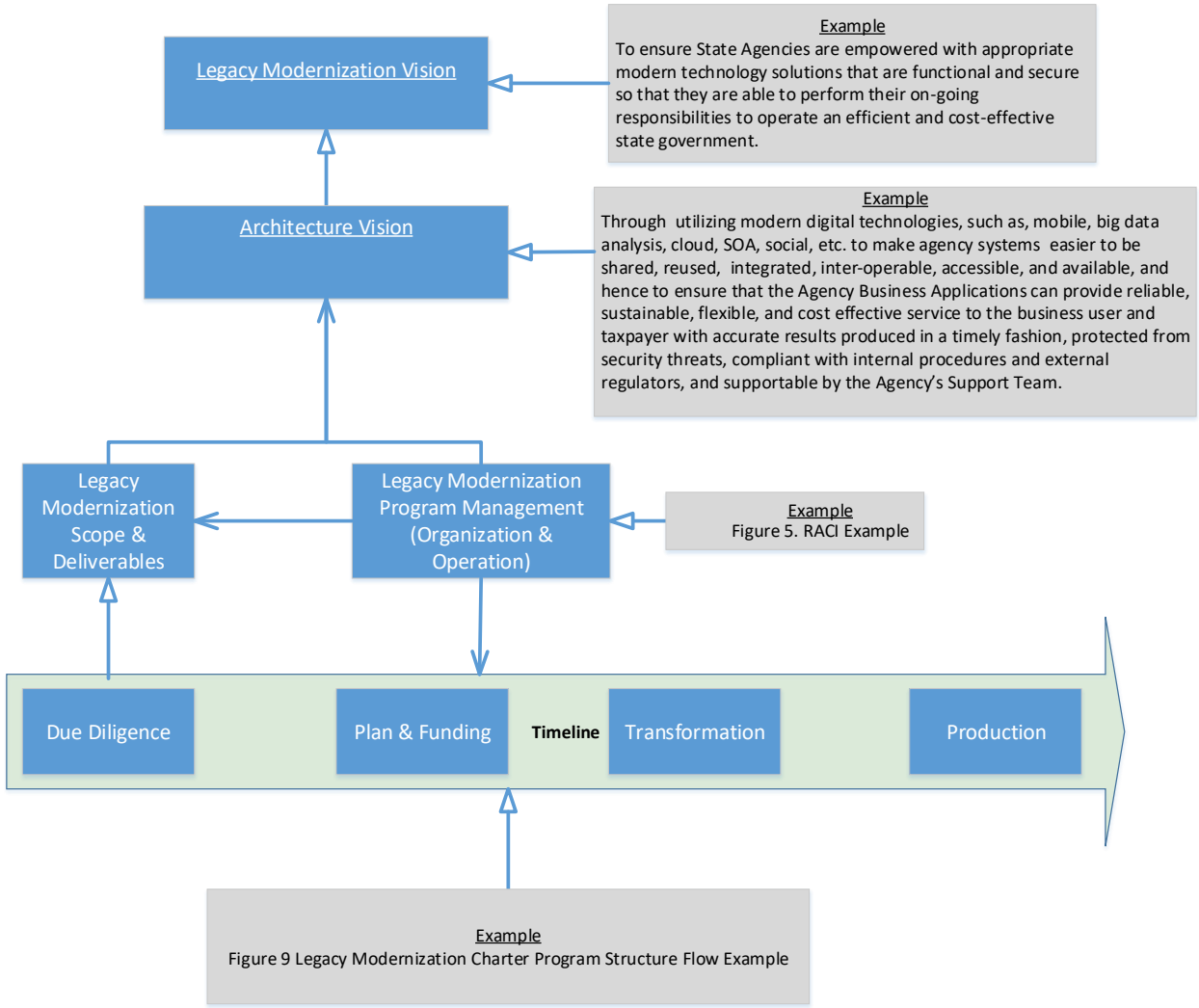
	Deliverables	Executive Sponsor	Mod Coalition	Mod Plan Manager	Portfolio Manager	ESS Advisor	Business Owners	Business Analysts	IT Manager	IT Architects
	As-Is Analysis									
1	Business Architecture	I	I	A	I	C	C	R	I	I
2	Data Architecture	I	I	A	I	C	I	R2	C	R1

3	Application Architecture	I	I	A	I	C	C	R2	C	R1
4	Technology Architecture	I	I	A	I	C	I	C	C	R
	To-Be Analysis									
5	Business Architecture	C	C	A	C	C	C	R	I	I
6	Data Architecture	C	C	A	C	C	I	R2	C	R1
7	Application Architecture	C	C	A	C	C	C	R2	C	R1
8	Technology Architecture	C	C	A	C	C	I	C	C	R
	Strategic Planning									
9	Revised Goal/Expectations	C	C	R, A	C	I	C	I	C	I
10	Impact Analysis	I	I	R1, A	C	C	C	R2	C	R3
11	Gap and Opportunity Analysis	I	I	R1, A	I	C	C	R2	C	R3
12	Legacy Modernization Roadmap	C	C	R1, A	C	C	C	R2	C	R3
13	Initial Implementation & Migration Plan	C	C	R1, A	C	C	C	R2	C	R3

R = Responsible for completing that step in the process
A = Accountable for ensuring that step is completed
C = Consulted prior to the completion of that step
I = Informed of the results once that step is completed

Figure 7 - RACI Example

3.2.5 Modernization Charter Diagram Example



Additionally, Figure 8 – Modernization Charter Structure Overview example

Figure 8 and Figure 9 represent a Modernization Strategy Plan charter diagram. Additionally, Figure 9 provides a visualization of the four stages: Due Diligence, Planning and Funding, Transformation, and Production as introduced in section 3.1.2. Some of highlighted areas include:

- Agency's need to seek funding
- DIR Delivery Services available to the agency

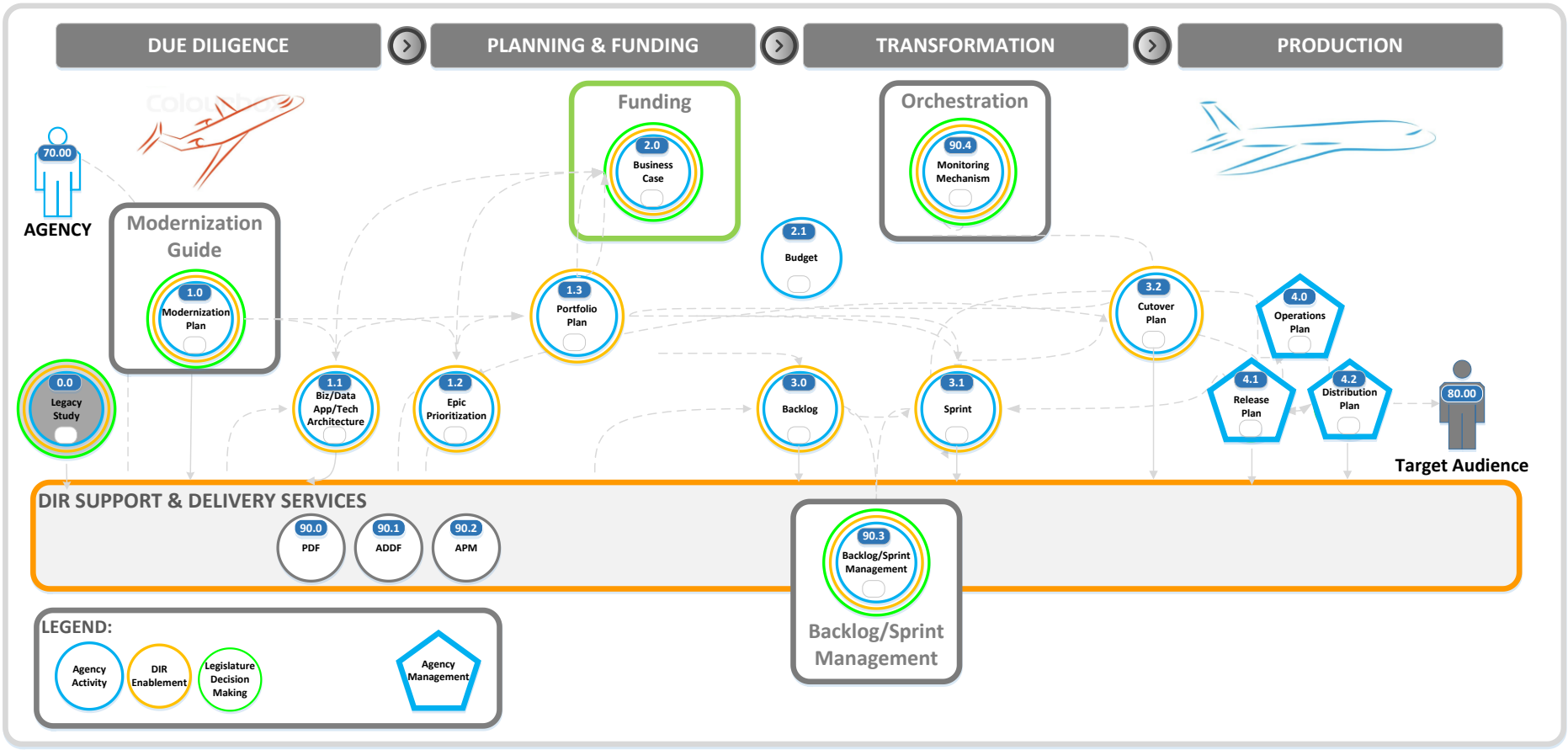


Figure 9 - Modernization Charter Program - Flow Overview

3.2.6 Assumptions

The LM program should list the assumptions on scope, participants, internal and external partners, budget, dependences, deliverables, etc.

3.3 Legacy Modernization Due Diligence Stage

3.3.1 Due Diligence Stage Overview

As Figure 5 - Legacy Modernization Approach Overview (Level 0) on page 22 shows, this stage includes three phases: Legacy or As-Is Analysis, Modern or To-Be Analysis, and Strategic Planning. The Level 1 diagram of Figure 10 below provides a more detailed view.

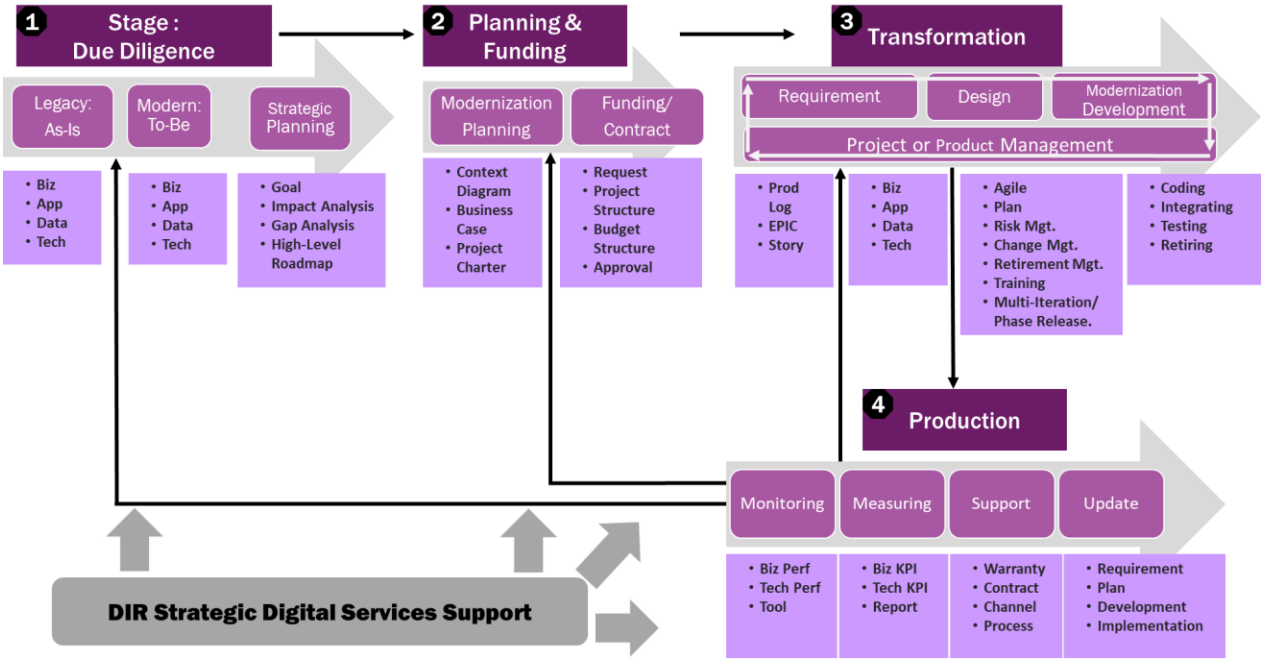
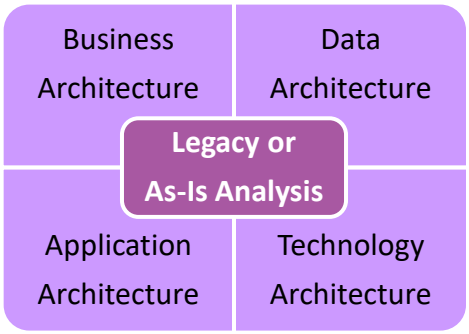


Figure 10 Legacy Modernization Approach (Level 1)

- In the Legacy or As-Is Analysis phase, an agency should collect, analyze, and document information about its current business architecture (e.g., capabilities, processes, model, operation), application architecture, data architecture and technology architecture, analyze and document them, and identify the pain points or challenges.
- In the Modern or To-Be Analysis phase, an agency should analyze the requirements, pain-points, etc. and identify and design high-level To-Be solutions to address these from the perspective of business architecture, application architecture, data architecture, and technology architecture. Utilize appropriate modern technologies and business and capability models.
- In the Strategic Planning phase, an agency should first validate the goal of the LM, then analyze the gap between the As-Is and To-Be states from business, data,

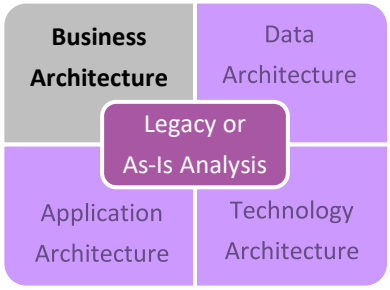
application, and technology architecture perspectives. Based on the goal and the gap analysis, design a high-level, multi-phase roadmap plan for transforming from the As-Is to the To-Be state; use strategic, organizational, operational, application, data, and technology perspectives. The roadmap will become the key input for stage two: Planning and Funding.

3.3.2 Legacy or As-Is Analysis



In the "Legacy or As-Is Analysis" phase of Due Diligence, an agency will collect, analyze, and document the architecture information about the current business (e.g., capabilities, organization, operation, process), data, applications, and technologies used to support the business.

3.3.2.1 *Business Architecture*



3.3.2.1.1 Objectives

The objective of an As-Is Business Architecture analysis is to:

- Identify, analyze, and document the existing business architecture which describes how an agency needs to operate to achieve its business goals.
- Identify, analyze, and document the requirements and pain points of the existing business architecture.

3.3.2.1.2 Approach

In summary, a Business Architecture describes the product and/or service strategy, and the organizational, functional, process, information, and geographic aspects of the business environment.

To systematically conduct a business architecture As-Is analysis, the following analyzes are to be included:

- **Business Model Canvas analysis**
  Provides high-level items-of-interest to be used in subsequent phases.
- **Business Capability analysis**
  It will utilize the value chain or value stream information from the Business Model Canvas analysis to identify the business capabilities.
- **Business Process analysis**
  It will use the results from Business Capability analysis to identify the business processes which implement the business capabilities.
- **Business Domain Model analysis**
  Show the relationships between objects as a class diagram. The objects represent business components with their attributes and operations. The model is used to maintain business vocabulary terms and enable clear communication about the parts of the business.
- **Business Application Portfolio Model analysis**
  Use the result from Business Process analysis to identify the related business application(s) which support or implement the tasks or activities in the business process. Use the result from the Business Domain Model analysis to provide consistent references and terms throughout.

Generally, these architecture artifacts will be documented at level 0 or level 1. For some significant architecture components, the agency should document their architectures at more detailed levels 2 or 3.

3.3.2.1.3 Inputs

- Existing business architecture documents, which may include some of the following:
  - Business principles, business goals, and business drivers
  - Organizational Model
  - Operation Model
  - Process Model
  - Roles and Responsibility Model
  - Use Case Model
  - Domain Information Model

- Capability Model

3.3.2.1.4 Steps

- Identify major business principles, objectives, drivers and requirements
- Identify key stakeholders/audience
- Collect and review existing Business Architecture documents
- Obtain Subject Matter Expert (SME) contact information
- Interview SMEs and conduct focus-group discussion(s) if needed
- Conduct Business Model Canvas analysis
- Conduct Business Capability analysis
- Conduct Business Process analysis
- Conduct Business Domain Model analysis
- Conduct Business Application Portfolio Model analysis
- Document As-Is business architecture
- Identify and analyze pain points in the business architecture
- Conduct formal stakeholder review
- Finalize As-Is business architecture

3.3.2.1.5 Outputs

As-Is business architecture analysis document, which may include the following:
Note – many of the models will be represented as diagrams.

- Business Model Canvas
- Business Domain Model
- Business Capability Model
- Business Process Model
- Roles and Responsibility Matrix
- Use Case Model
- Business Application Portfolio Model
- Business Requirements
- Mapping, Matrix or relationship diagram between Value Chain, Business Capability, Business Process and Business Application
- A list of pain points
- A wish list if any

The following subsections illustrate some tools or approaches agencies may use to develop business architecture artifacts. They include Business Model Canvas, Business Capability Analysis, Business Process Analysis, Business Domain Model, and Business Application Portfolio Model.

3.3.2.1.6 Business Model Canvas

Before an LM program can begin, it is important to have a complete view of the values, structures, and activities within your business. One tool for helping people to achieve the business view is a Business Model Canvas (2010. Business Model Generation, A. Osterwalder, Yves Pigneur, Alan Smith, and 470 practitioners from 45 countries, Wiley published). Dr. Osterwalder's diagram reduces a business to:

- Key Partners
- Key Activities
- Key Resources
- Value Propositions
- Customer Relationships
- Channels
- Customer Segments
- Cost Structure
- Revenue Streams

Figure 11 - Amazon Kindle Business Model Canvas (below) is an example of a Business Model Canvas for Amazon Kindle. The Business Model Canvas provides the high-level items of interest for subsequent phases. The elements above can be used to define *Value Streams*, which become the basis for capability models. A Business Model Canvas Template is provided in Appendix 6.14 Business Model Canvas Template.

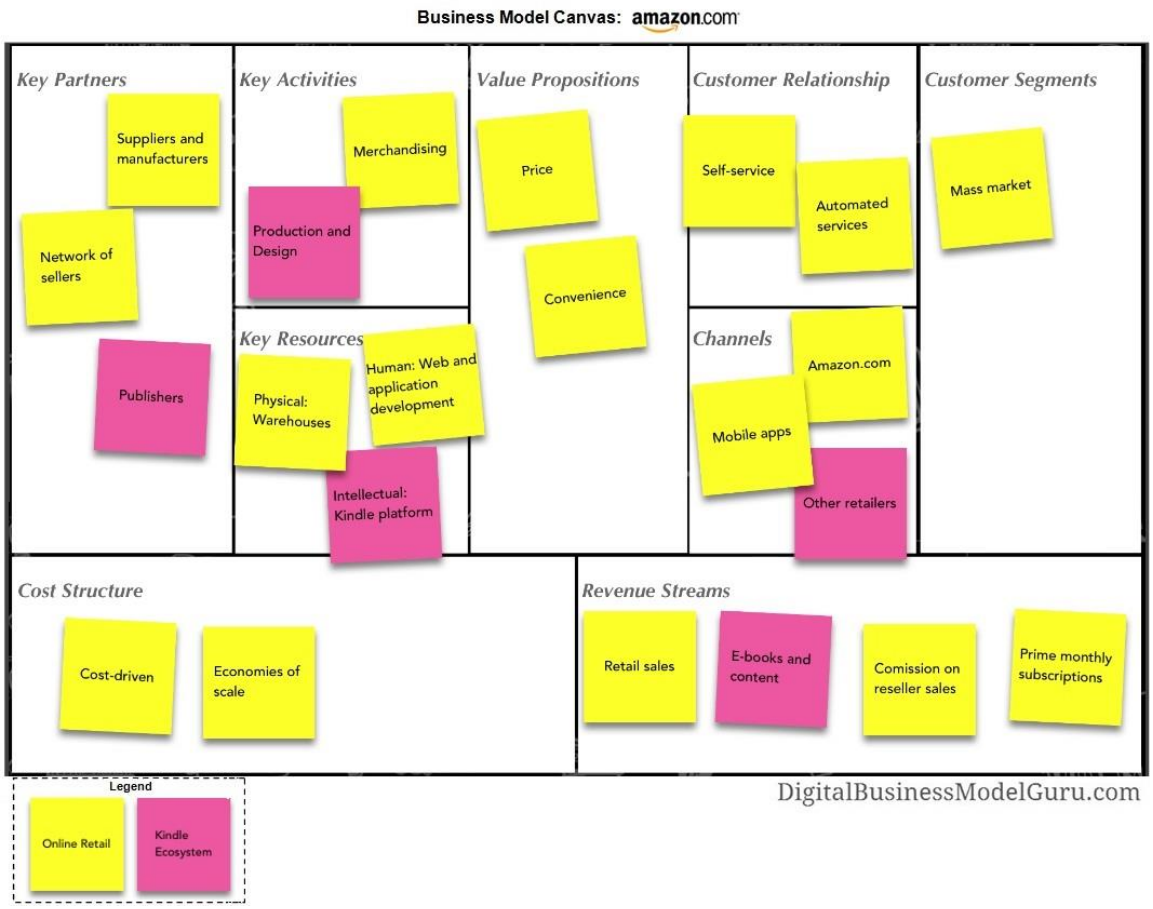


Figure 11 - Amazon Kindle Business Model Canvas

3.3.2.1.7 Business Capability Analysis

A "business capability" model is a representation of an agency's business, independent of the enterprise structure, processes, people, or domains. It is designed to enable an agency to express and explore "what we do," so it can make decisions about "how we do it." The goal is to provide a layer of abstraction from the details of how a business operates (including agency business units/domains, information, and technologies), based on what the agency "does". The benefit of this kind of modeling is that it enables agency business and IT strategic planners to focus on the business first and foremost, as well as make decisions based on the business. Then, they can link these decisions to architectural changes. Another equally important benefit is to enable the enterprise architects and IT practitioners to have objective discussions about business capabilities without first focusing on the technology, roles, processes, and information details. Drilling into these details too early can derail business model and organizational optimization discussions.

How to conduct a Business Capability Analysis

A Business Model Canvas is a method that can be used to help an agency define the Value Stream for its business. Value stream analysis is used to separate those activities that contribute to value creation from those activities that create waste and to identify opportunities for improvement. The value stream is an end-to-end collection of activities that create a result for a customer. Value Streams are commonly represented as a series of progressive stages. A value stream is initiated by an internal or external stakeholder and ends when stakeholder gratification is achieved.

After defining the stages within the value stream, the next step is to identify the business capabilities that will be required to support each stage within the value stream. These capabilities will need to be conveyed in a level-of-detail appropriate to the level of understanding required by various types of stakeholders.

Capabilities are described in a *capability model* which is a hierarchical description of what the business does. The number of capability levels depends on the complexity of the business, where each level is a decomposition of one or more capabilities from a higher level. A capability should not be viewed as a process. Business Capabilities will be supported by Business Services (i.e., processes, roles, information, and systems).

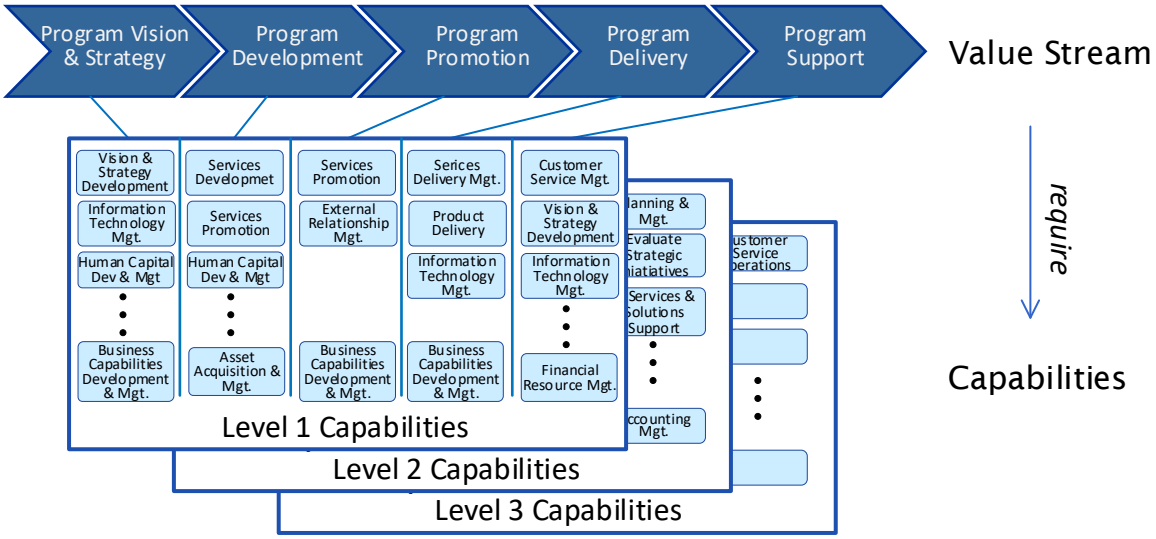


Figure 12 - Value Stream and Business Capabilities

Once the value-producing capabilities have been defined, then the processes that support each capability will need to be identified or newly defined. If an existing process does not align to a required capability, that process should be a candidate for a detailed analysis that could lead to making process-associated changes.

Business Capability, Business Process and Business Applications/Systems

- Business capabilities are implemented with a set of business processes, which are supported by various business applications or systems.
- The following diagram (Figure 13 - Relationship Example of Business Capability, Process and Business Application) shows the overall relationships between business capability, process, and application/system.

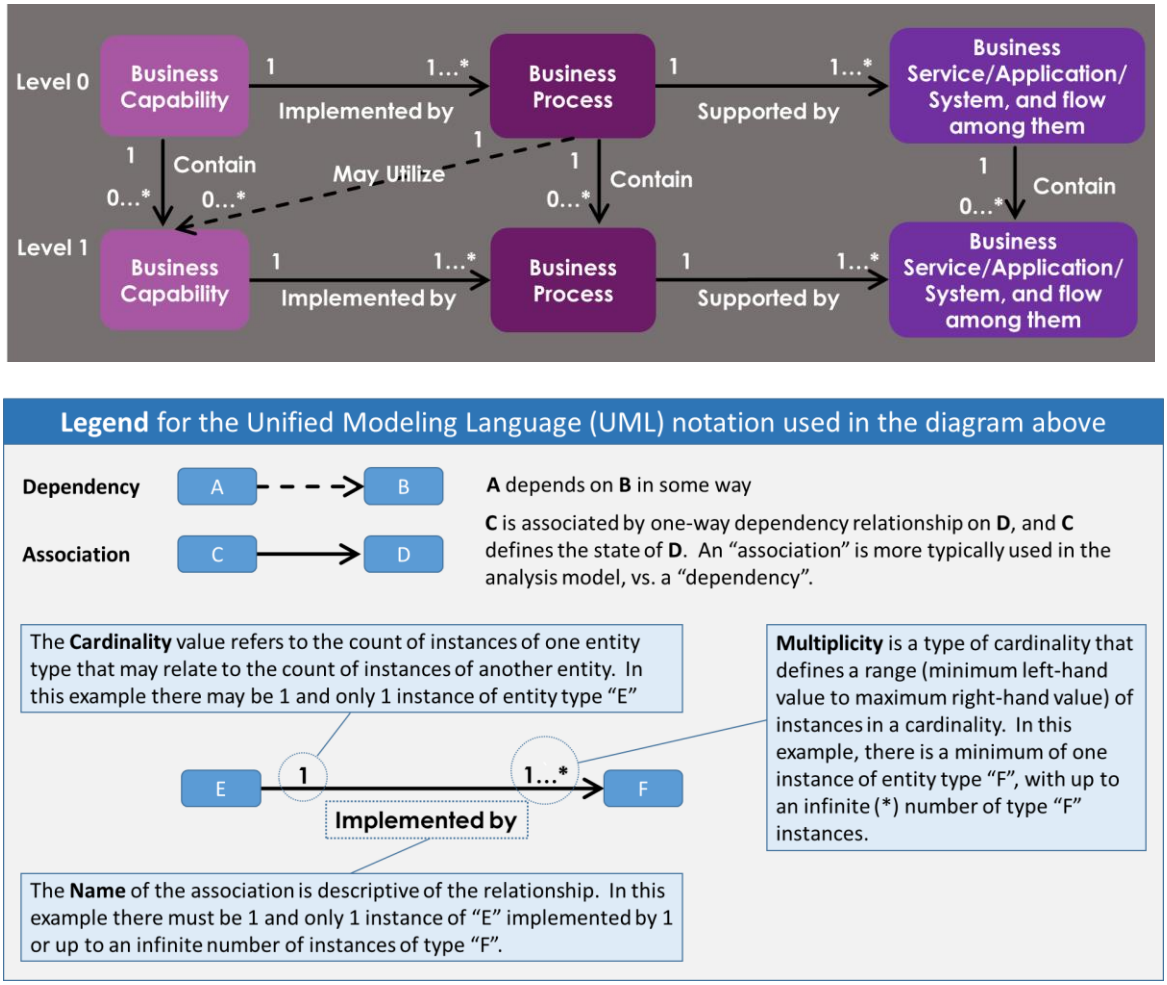


Figure 13 - Relationship Example of Business Capability, Process and Business Application

3.3.2.1.8 Business Process Analysis

Identifying a Process

Where business capabilities describe what the business does, business processes describe how the business performs, or implements the given capability, and how capabilities are connected to deliver a desired outcome. Business processes can be described by a

sequence of activities and tasks that implement those processes. Process activities and tasks are supported by business services implemented by roles, information, business applications, systems, or tools.

The APQC Process Classification Framework (PCF) demonstrates a standard format for identifying and classifying processes in a business environment. APQC supplies multi-industry PCF taxonomies of business processes. The two PCF's that are most applicable to government are the Cross-Industry and City Government PCF's (available as spreadsheets or as PDFs and is included in the **Package of LM Guide Appendix materials**.

The APQC PCF uses five levels of process categorization within each of its 13 high-level process categories. This categorization can be used to help identify levels of increasing process component detail, starting from the top at the conceptual enterprise level, and moving deeper to the task level. **Do not confuse the 5 APQC process classification levels with the 0 to 3 levels of audience-targeted lenses described in section 2.5.8.**

Figure 14 – APQC Process Level Classification (below) is an example of a process category deconstruction (*Develop Vision and Strategy*, PCF category 1 of 13 PCF categories). Each level in the PCF identifies a range of process components. This diagram shows a level of component detail from a Level 1 Category down to a very specific Level 5 Task.

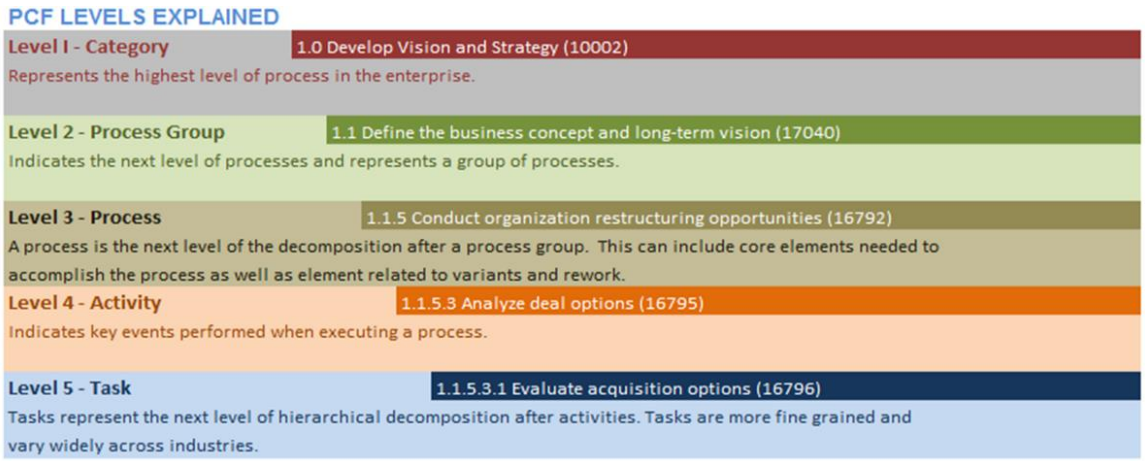


Figure 14 – APQC Process Level Classification

As one enterprise, Texas government with about 120 agencies is authorized for internal use of the APQC Process Classification Framework (PCF) for classifying and defining processes in Texas government across agencies. This usage aligns with the service terms of PCF. Refer here for external use requirements.

DIR recommends that organizations use the APQC PCF as a starting point for consistent naming of processes in their business environments. This move toward consistency will help in both identifying re-usable processes and measuring the performance of like

processes across the agency or state-wide enterprise, as the PCFs include a series of standardized process metrics. **PCF Levels 1 and 2, and potentially Level 3, can also be used to define business capabilities.** Using the APQC PCF as the basis for defining business capabilities will further increase cross-departmental and cross-agency consistency and will reduce the risk of not including all key process elements during a modernization due diligence analysis.

Overview of Business Process Analysis

The purpose of the Business Process Analysis phase is to understand and communicate key business operations through creating diagrams of all business processes that generate value and which will need to be included in the LM Plan. Each business process (implementing a certain business capability) includes a series of activities or tasks enabled by roles, business applications, data, and technology infrastructure.

Once an agency has identified the value streams within their environment, they can deconstruct a value stream through lenses at varying levels of abstraction according to the level of understanding needed. The following section uses our concept of "Artifact Design Levels" in section 2.5.8 to combine the concept of business capabilities and business processes into four basic audience-targeted viewing levels, based on abstraction and detail.

- **Level 0: Enterprise Lens (Value Chain View)**
  A purely high-level view that names the capabilities within an entire business and shows how they interact with one another from a value producing perspective, as the *Value Chain* diagram below shows.

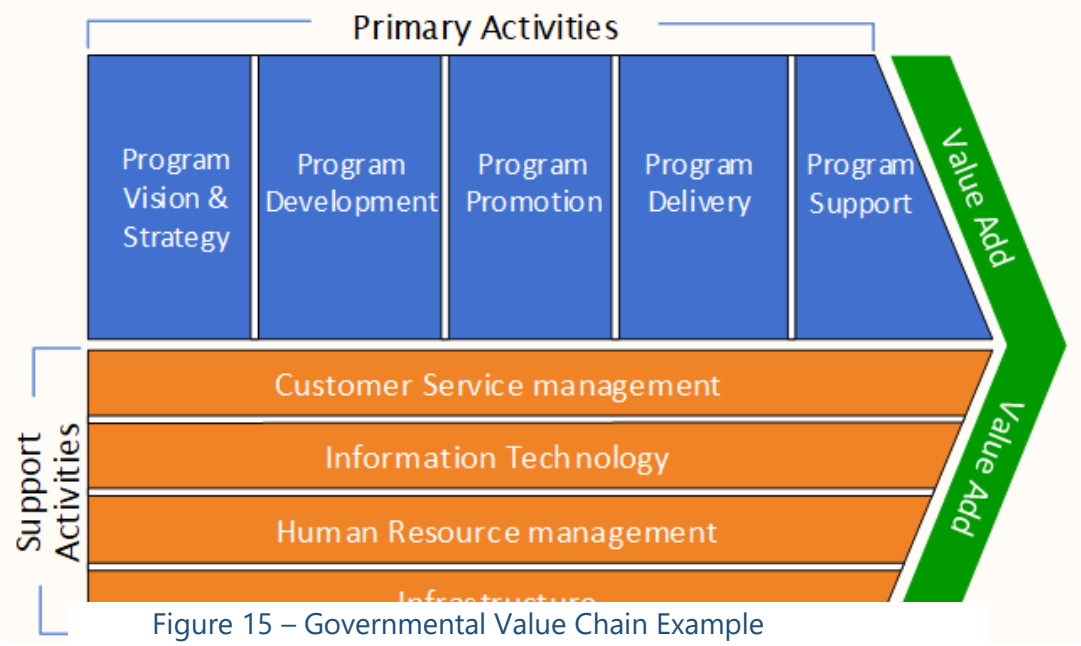


Figure 15 – Governmental Value Chain Example

Level 1: Operational Lens (Business Capability View)
Isolation and analysis of a value stream leads to identifying the business capabilities required to provide value within each stage of that value stream. In the example below, the value-stream will primarily include Human Capital Management capabilities. Other capabilities, such as Asset Management, Security Management, and IT Infrastructure Management will also be needed during the onboarding stage of this value stream.

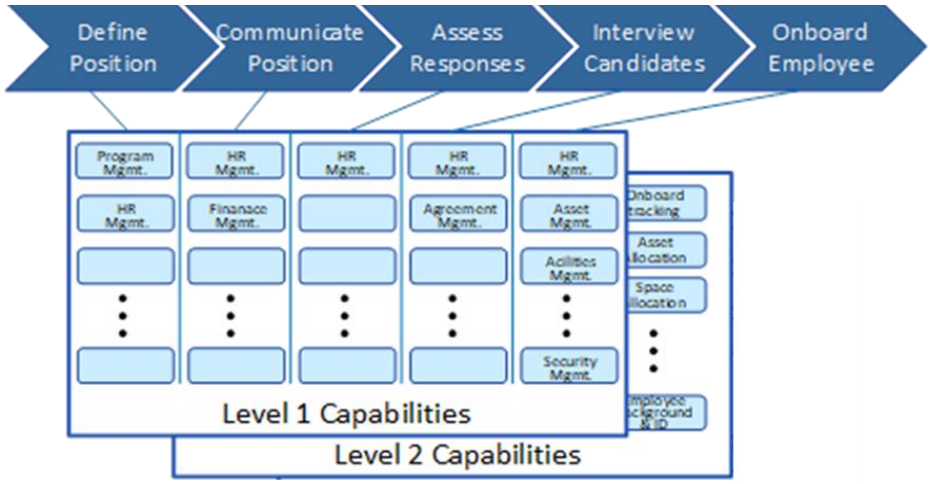


Figure 16 - Recruit Employee Value Stream and Capabilities

- **Level 2: High-Level Process Lens (Business Process High Level)**
  Beyond the Operational Lens, capabilities within categories are further divided into the supporting business process that implements the business capability. The business process includes activities that will be enabled by business roles, business applications, and data stores.

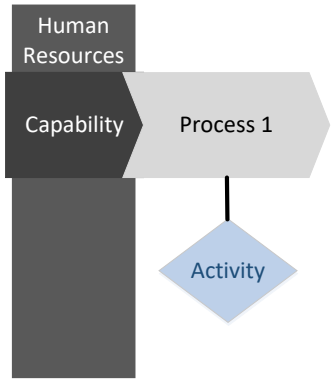


Figure 17 - Business Process Analysis Level 2 Diagram Example

- **Level 3: Detailed (Low-Level) Process Lens (Business Process Low Level)**
  Beyond the High-Level Process Lens, every component necessary for a capability to

function is further divided into the specific inputs and outputs they provide and require, as well as all activities that compose that task. For example, the "Human Resources" capability may require a "Training" application that connects to a data store of all users and is housed in a server rack of virtualized containers.

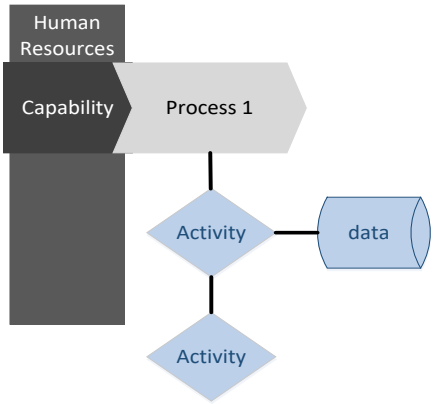


Figure 18 - Business Process Analysis Level 3 Diagram Example

The Figure 19 below represents the entire spectrum of a high-level *Value Stream* with its associated capability levels, processes, and enabling business services.

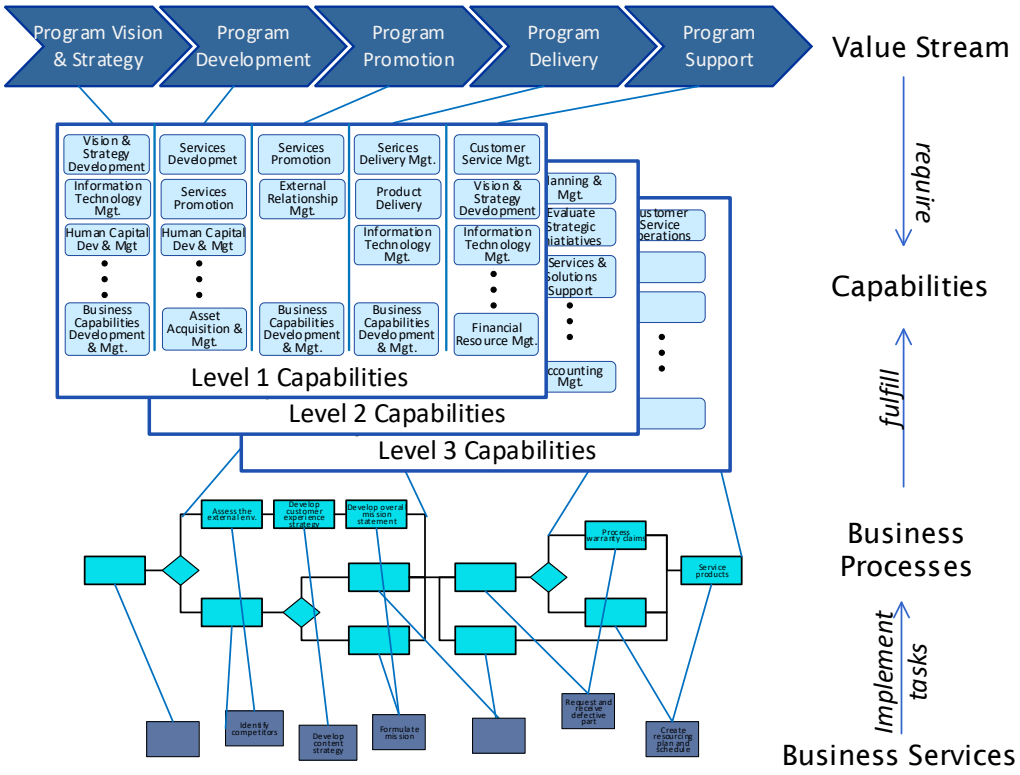


Figure 19 - Business Value Stream, Capability and Process Analysis Diagram Example

Value Stream Deconstruction

DIR recommends that agencies begin their process analyses by identifying the value stream(s) that show the primary stages which best describe how each value-producing product or service is initiated, developed, and delivered to constituents. DIR also recommends that agencies use the APQC Cross-Industry and/or City Government PCFs to derive standardized, hierarchical/numbered business capability descriptions, processes, and activities. This capability derivation method is described below. PCF-derived capabilities provide a standardized method for deconstructing each value stream stage into the desired level-of-detail. This capability deconstruction will facilitate various types of analyses. In addition to enabling standardization across departments and agencies, using the APQC PCFs as a common source for defining business capabilities ensures alignment with the capability descriptions used and supported by the State's Application Portfolio Management (APM) service. A value stream deconstruction example is included in Appendix 6.16 "Value Stream Deconstruction Example Using APQC PCF-Derived Capabilities.

The off-the-shelf APQC PCF descriptions are expressed as process verbs: <verb> <noun> (e.g., Manage Grants). PCF Level 1 (Category) and Level 2 (Process Group) elements can easily be transposed into Level 1 and 2 capabilities. PCF Level 3 (Process) elements could potentially be represented as either a capability or as a process. Because capabilities are nouns: <noun> <action noun> (e.g., Grants Management), this expression of a capability can be performed by transposing Level 1, 2, and 3 PCF descriptions as nouns. DIR has already performed this conversion for all Level 1, 2, and 3 classifications that are included in the Cross-Industry and City Government PCFs. This is the same list of capabilities that is shared with APM. The spreadsheet listing the PCF-derived capabilities is available on the Package of LM Guide Appendix materials.

Once an agency-level or department-level value stream has been defined during a facilitated Business Model Canvas development session, start the value stream deconstruction by aligning the capabilities that are applicable to the six APQC PCF *Operating Processes* (See PCF classifications 1.0 to 6.0 in Appendix 6.15 APQC PCF. From these six classifications, we can derive the capabilities directly responsible for delivering a valued product or service to an external customer. (Note: value streams for internal customers will likely not include *Operating* process elements, only *Management and Support* service elements). Once the applicable Operating Processes have been aligned with a stage within the value stream, then determine the *Management and Support* PCF elements that also align to a value stream stage.

List utilized Level 1 capabilities directly under its applicable value stream stage. Then below each Level 1, list any applicable Level 2 capabilities. Depending on the level of your analysis, you might also deconstruct Level 2 capabilities into Level 3

Capabilities/Processes, Level 4 *Activities*, and if needed, Level 5 *Tasks*. Refer to the value stream deconstruction example in Appendix 6.16 for how to perform this type of value stream deconstruction. Value stream deconstructions will be key to conducting thorough process analyses and developing requirements.

If you are unable to locate an applicable classification from the PCF spreadsheet – try selecting the "Combined" tab of the PCF spreadsheet and search for the activity you seek to classify. The search result will likely provide one or more classification alternatives. It might be necessary to select descriptions from more than one PCF spreadsheet, as there are some differences in the descriptions between the Cross-Industry PCF and the City Government PCF. For example, there is no Grant Management in the Cross-Industry PCF. The City Government PCF includes some very city-specific descriptions, which are more applicably described for a state government scenario within the Cross-Industry PCF.

Business capabilities can be rated and then color-coded according to each capability's status or rated effectiveness. Those capabilities rated as low effectiveness (red-colored) would indicate a capability that should be targeted for a detailed process analysis. A sample *Capabilities Heat Map* is included in Appendix 6.17 Value Stream and Capabilities Heat Map Example.

The Heat Map described above will help target the capabilities that merit a more detailed analysis. Figure 20 - Business Capability Analysis below (from the ADDF) describes the "high-level" capability elements to be defined for each capability targeted for an in-depth evaluation. The next step will be to create a Business Domain Model.

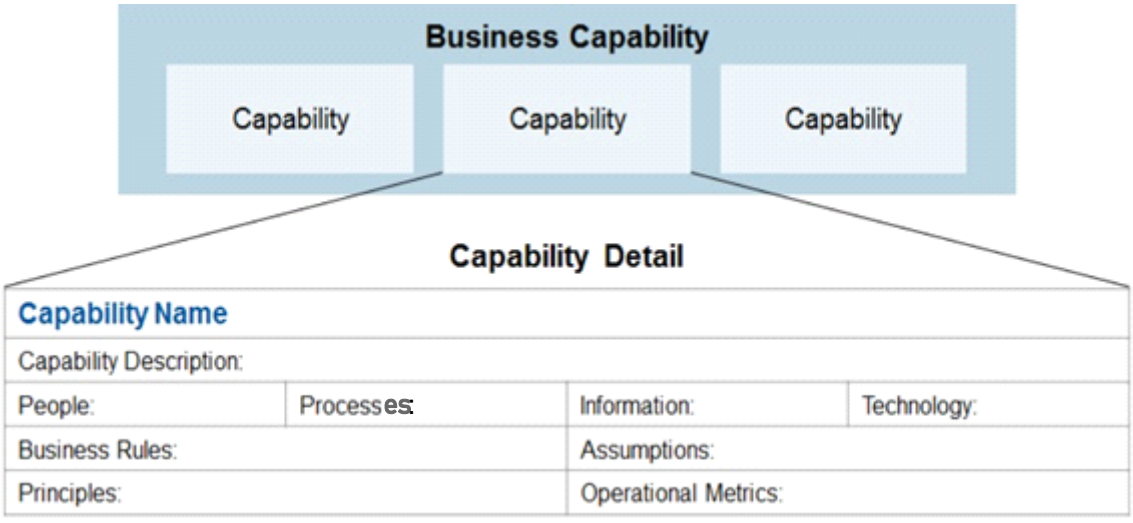


Figure 20 - Business Capability Analysis (from ADDF Business Capabilities Modeling)

Business Domain Model

A Business Domain Model is a simplification of a complex business service scenario used to facilitate an understanding of that business. Once the business architecture overview has been categorized and documented using the applicable value streams and deconstructed business capabilities, business domain models can be built to logically represent how the business concepts or classes relate to one another and which elements will be fulfilled by a system. The relationships between business concepts/classes/activities can be represented through 0 to 3 levels-of-detail, which will provide insight into how information is involved in the business, including the rules the business uses in relation to that information. A Level 3 business domain diagram will look somewhat like a data diagram. Although these diagrams may look similar, a business domain diagram will use the terms that are utilized by the business owners. The Business Domain Model example in Figure 21 was derived from the Value Stream Deconstruction example in Appendix 6.16. This example has a Level 1 level-of-detail and includes mutiplicity and action relationships between class objects.

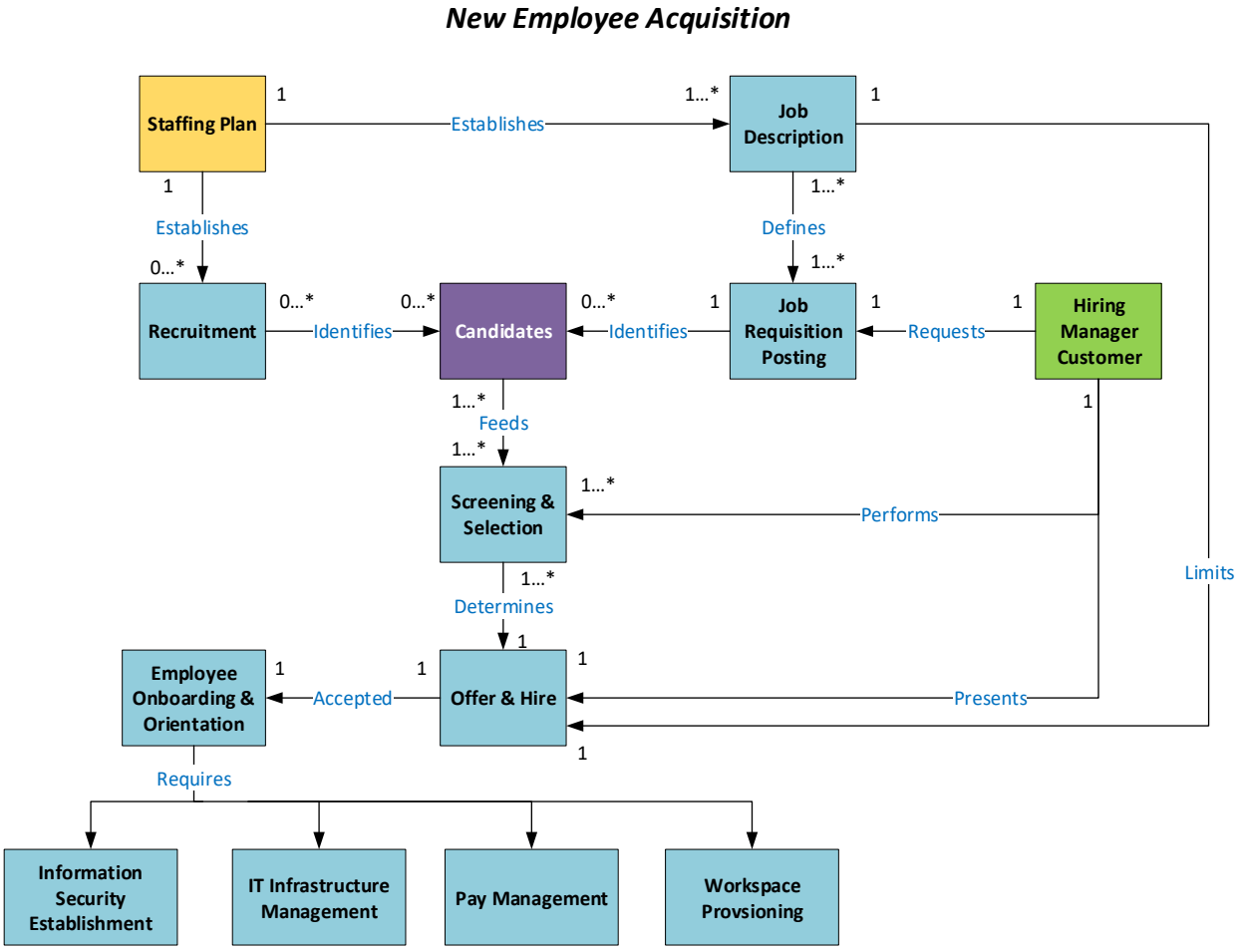


Figure 21 - Business Domain Model Example

Domain Models come in many forms, which vary on the balance between technical and organizational needs. This documentation requires a focus on organizational needs, so focus on what information output and input is needed from business partners and the activities deconstructed from the Capability Model. The next step will be the detail modeling of the processes described by the Business Domain Model.

Term-Fact Modeling for Unified Understanding

The Business Domain Model is a flowchart with labeled items – without proper formation, the meaning of each label could be ambiguous or synonymous. As the flowchart is created, a glossary is needed to give each label a specific meaning. This glossary is referred to as the Term-Fact Model.

Term-fact modeling is performed to capture the business semantics in a way that enables development of rule-based systems, and for the determination of data sources.
The first and most important deliverable of term-fact modeling is the definition of the terms that are important in the business domain. In most cases, term definitions are provided in a business glossary. The business use for each term should be classified as a Class object, Role/Actor, Attribute/Data, or Method. Words that are nouns and phrases within your capability deconstruction are likely to be Class objects. Words that represent a person performing an action are a Role/Actor. Verbs (such as 'deposit') may be a method. If the word is a simple value, such as 'color' (string) or 'money' (number), then it is probably an attribute. In some cases, verbs can also be classes, for example: Deposit. An example of how this glossary could look is provided in the table below:

Term	**Description**	**Business Use** (Class, Role, Attribute, Method)
Actual Customer	The role of a **Legal Entity** agreeing to exchange the **Sale Price** for a **Product** in a **Sale.**	Class, Role
Potential Customer	Any **Legal Entity** who may become an **Actual Customer.**	Class
Customer	Any **Legal Entity** that may be an **Actual Customer** or a **Potential Customer**.	Class

Process Analysis

Some agencies require process models and conducting a process improvement review before conducting a system modernization. The rationale being that a new system should be designed around an improved process rather than a process that has remained the same for several years. Defining the As-Is process models is, thus, critical to identifying process points that can be improved via operational changes, or by introducing improvements that could be enabled by a new technology.

In a Value Stream Deconstruction, capabilities are decomposed into processes and activities, which then can be projected as Business Domain Models. In previously referenced examples, processes were described in terms of their descriptions rather than as 'Process Models' that include the details for how a process is performed. A process model is most often depicted as a workflow diagram. Depending on the cross-functional nature of the process, the roles that are responsible for each step in the process can be depicted within "swim lanes". The following is an example of a [Microsoft Visio] process model using swim lanes to represent the business units performing each activity.

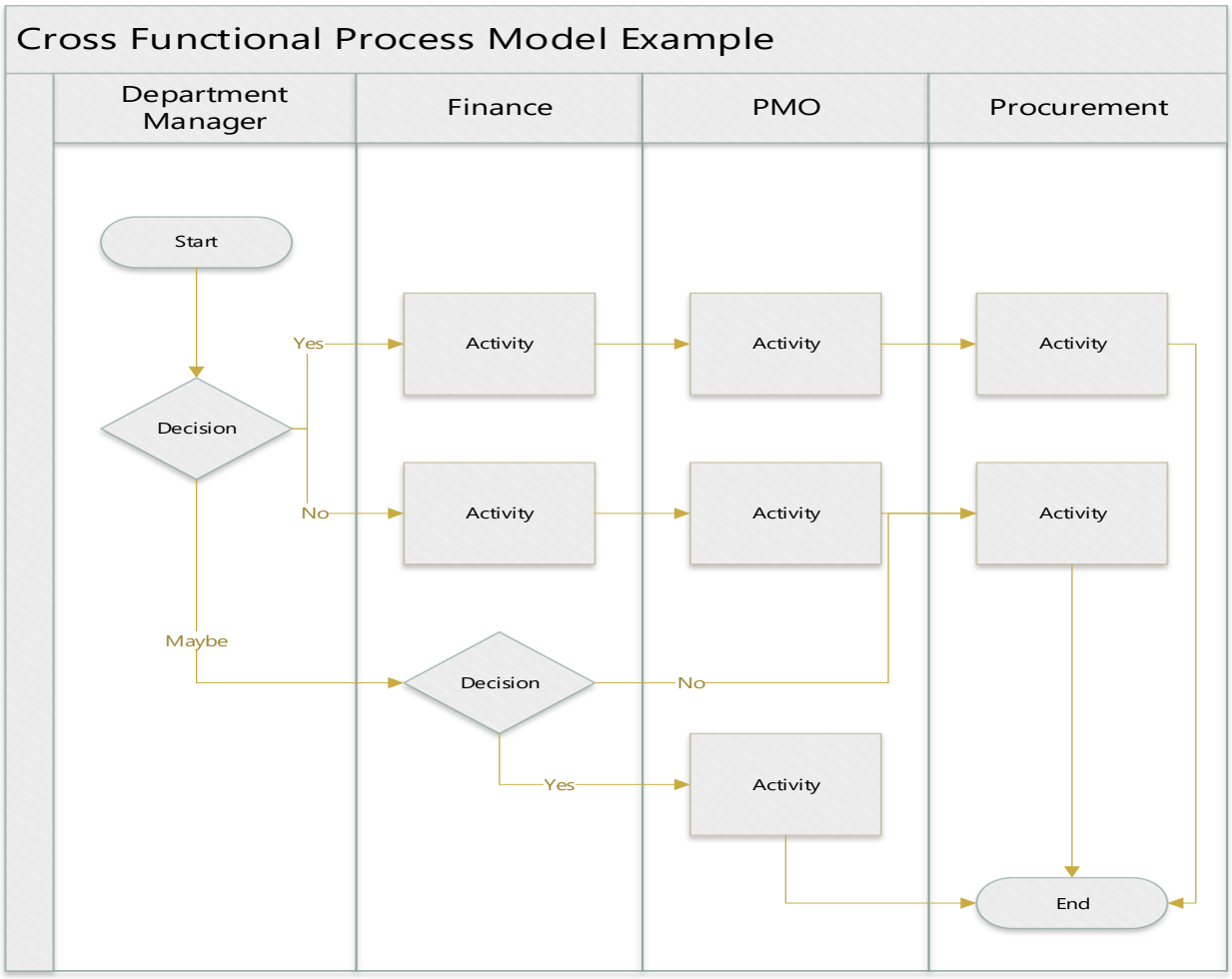


Figure 22 – Process Model Example

Process Analysis, as a tool for establishing the LM Plan, can be used in several ways depending on the environment and the lifecycle point of the strategy:

- **Employee Onboarding**
  New employees introduced to the company can use it as a guide to understand the structure of the company, and how its capabilities interact with one another.

- **Systems Development**
  During the Software Development Lifecycle (SDLC), it can serve as a requirement gathering tool that allows project managers to identify conflicts and opportunities within processes impacted by LM.
- **Change Management**
  This map can be used to assess changing outgoing and incoming communication between applications within the agency and across different businesses.
- **Process Improvement**
  A view of all processes impacted by LM provides a lens to review where metrics-gathering and new applications could generate value.

Role in Modernization Strategy

The Business Process Analysis phase creates a framework for the work that is necessary to complete the agency's modernization process. Once completed, the four process levels outlined in the Overview of Business Process Analysis section provide several benefits for planning purposes:

- **Project Decomposition**
  Business capabilities are given scope, reduced to their manageable processes.
- **Prioritization**
  Scoped business capabilities and their processes can be assessed for their placement and importance in the greater modernization plan.

Resource Prerequisites

Resources necessary for the completion of a Business Process Analysis include software packages that streamline the diagram creation process, individuals like SMEs, and a business architecture repository (e.g., repository of business processes).

Personnel

The following are functional roles recommended for the activities described in this section. They are not necessarily staff positions.

- Roles: Business Architect, Business Analyst, Technical Analyst, and SME(s) on the related components and tasks for the business process.
- Dedicated resource to develop and maintain the business architecture components (e.g., business process document and diagrams)

Software and Tools

For most agencies, Microsoft Visio is readily available. For a quick start, an agency may use it to create the diagrams/artifacts used in Business Process Analysis. However, there are other much more comprehensive Enterprise Architecture (EA) tools for Business Process Analysis available on the market.

3.3.2.1.9 Business Applications Portfolio Model

Overview of Business Applications Portfolio Model

As opposed to the business capability and process analyses above, the Business Applications Portfolio Model focuses more on business applications, technology, and databases, and their relationships with business capabilities and processes.

Please refer to DIR's Application Portfolio Management (APM) project to get more help or service from DIR on APM analysis. The Business Applications Portfolio Model is organized through broad categories aligned with business capabilities and processes related to the LM Plan. Legacy Business Applications are cataloged in four (4) ways in an LM program, as previously outlined in section 2.4.2 Legacy Status:

- Tolerate
- Integrate
- Migrate/Modernize
- Eliminate

Furthermore, granular resources (e.g., business applications) are represented as numbered blocks within the greater Level 0 business capabilities; color-coded based on their TIME classification category. The numbers are linked to their corresponding resources (e.g., business applications) in the footer section of the diagram. For example, "Human Resource Management" (at Level 0) has capabilities of Training Registration and Onboarding. Each of these capabilities are implemented by some processes, which are supported by business applications (e.g., databases, software) and other resources, which are impacted by the LM Plan. For illustration purpose, the following example (Figure 23 - Business Application Portfolio Model Level 0 Example) is a condensed, facsimile version of the full Business Application Portfolio Model Figure 24 on the next page.

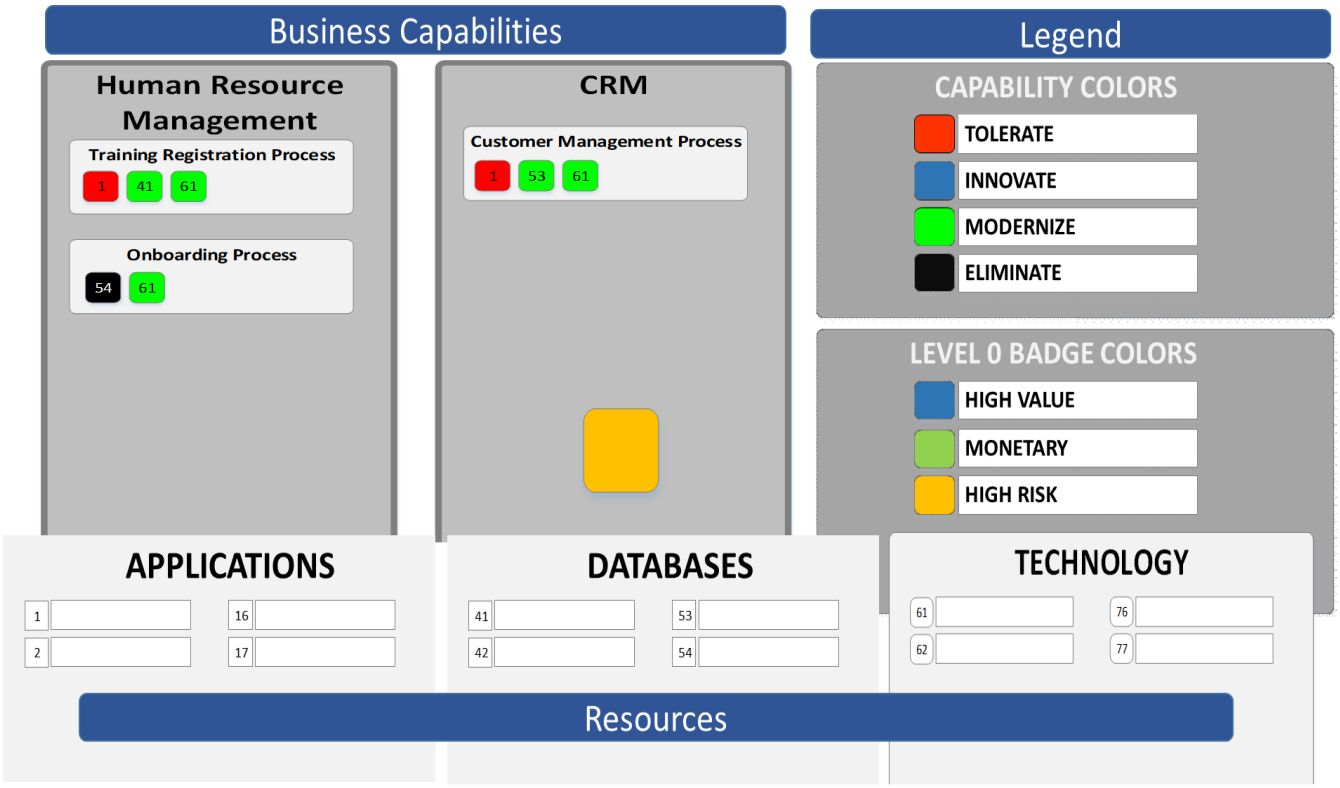


Figure 23 - Business Application Portfolio Model Level 0 Example

Business Application Portfolio Model Example

Representing all business applications with capabilities and their components across an organization leads to a much larger model than the example here. Figure 24 - Business Application Portfolio Model Example below is for illustrative purposes. For current information about DIR's APM initiative, please refer to the DIR website.

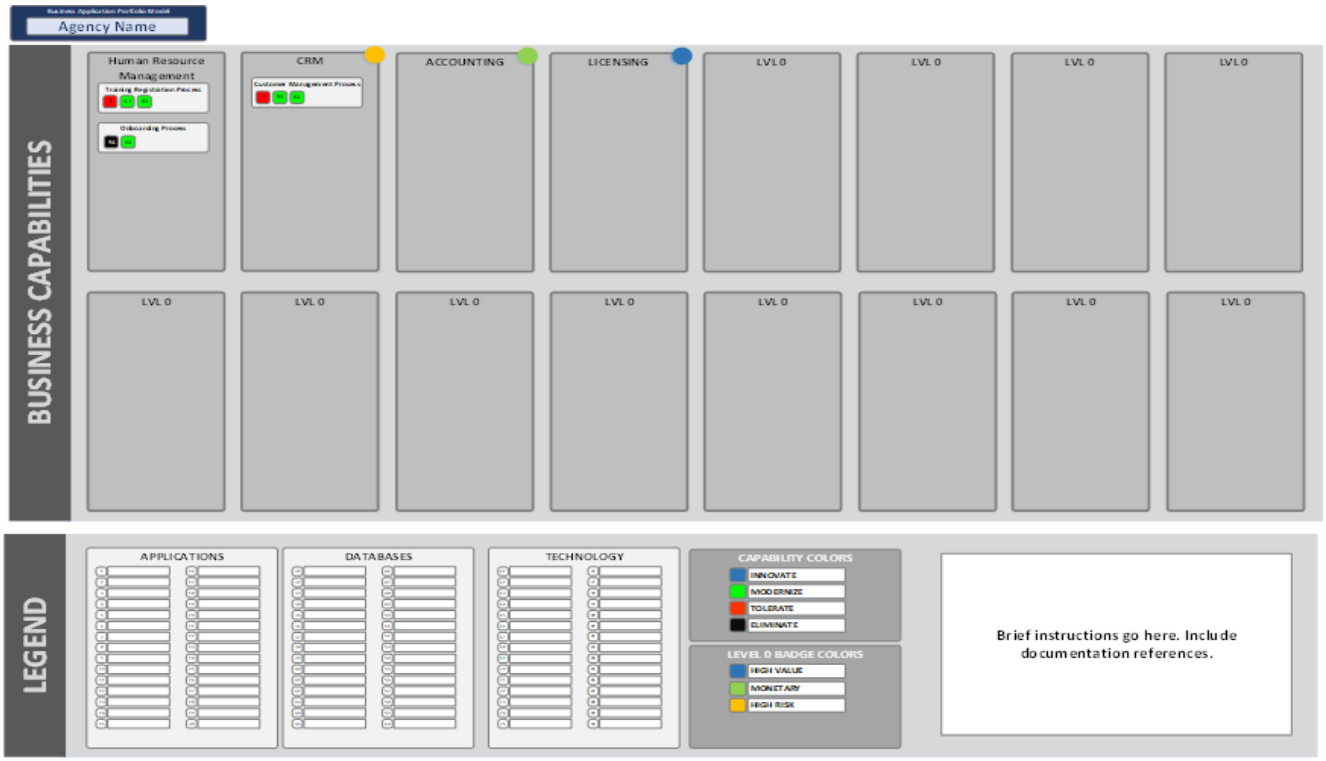


Figure 24 - Business Application Portfolio Model Example

An enlarged version of the Figure 24 is in Appendix 6.7 "Business Application Portfolio Model."

Usage

The Business Application Portfolio Model can be used in several ways depending on the environment and the lifecycle of the LM Plan:

- **Systems Development**
  During the Software Development Lifecycle (SDLC), it can serve as a guide for how processes and related systems or applications are changing within a business.
- **Process Improvement**
  The Business Application Portfolio Model presents all value streams through the Business Application Portfolio of a business. It can be used to identify business application capabilities in need of value-assisting processes. For example, if a process is identified as having no Business Applications, technology, or data associated with it (e.g., if its tasks are all performed manually), then it could benefit from modernization through process automation via some business applications or systems.

Role in the Modernization Strategy

After Business Capability and Process Analyses have taken place and the identified business application capabilities have been assessed for change management, the Business Application Portfolio Model provides the following information necessary for modernization:

- **Change Scheduling in Project Planning**
  Business application functions expanded or reduced via Business Capability and Process Analyses are now also categorized into how specifically they need to be changed in a prioritized and inter-dependent manner to align with business capability and process change priority.
- **Prioritization**
  With better knowledge for change management on a per-application or system capability basis, it is easier to plan the change and gauge how important each change is to the agency.

Resource Prerequisites

Resources necessary for the completion of a Business Application Portfolio Model Analysis include software packages that store the information and streamline the visual artifacts creation process, individuals (e.g., SMEs), and architecture repository (e.g., repository of business applications).

Personnel

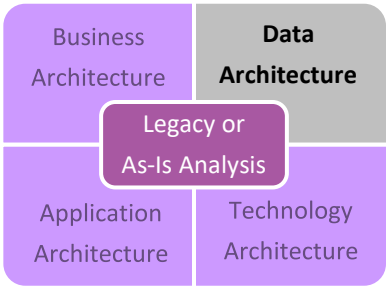
The following are functional roles recommended for the activities described in this section. They are not necessarily staff positions.
Roles: Solution Architect, Application Architect, Data Architect, Technology Analyst, and Business Analyst

Software and Tools

Agencies may use DIR's APM service to conduct APM analysis.
In addition, for most agencies, Microsoft Visio is already available for them. For a quick start, an agency may use Visio for the initial business application portfolio, artifacts, or diagrams development. However, there are other much more comprehensive Business Application Portfolio modeling tools available on the market.

- **Microsoft Visio**
  This professional diagram and flowchart program is a common tool for making the Business Application Portfolio Model. A general template for the Business Application Portfolio Model is provided in the LM Plan documentation, and general usage and tutorial information can be found here: *Using Microsoft Visio*.

3.3.2.2 *Data Architecture*



3.3.2.2.1 Objectives

The objectives of As-Is Data Architecture analysis are to:

- Identify, analyze, and document existing information and data architecture which enables As-Is business architecture, especially for the Business Domain Model (refer to Business Domain Model).
- Identify, analyze, and document the pain points of the existing information and data architecture.
- Determine duplicate data sources and assist in identifying "systems of record" for specific data.

3.3.2.2.2 Approach

The key considerations for As-Is Data Architecture Analysis includes:

- Data Management
    - A clear definition of which application components in the landscape will serve as the system of record or reference for enterprise master data.
    - Will there be an enterprise-wide standard that all application components or packages need to adopt, which can be prescriptive about the data models and may not be flexible?
    - Clearly understand how data entities are utilized by business functions, processes, and services.
    - Clearly understand how and where enterprise data entities are created, stored, transported, and reported.
    - What is the level and complexity of data transformation required to support the information exchange needed between applications?
    - What will be the requirement for software in supporting data integration with the enterprise customers and suppliers (e.g., use of ETL tools during the data migration, data profiling tools to evaluate data quality)?

- Data Governance
    - Structure: Whether the enterprise has the necessary organizational structure and the standards bodies to manage data entity (transformation).
    - Management System: Enterprises should have the necessary management system and data-related programs to manage the governance of data entities throughout their lifecycle.
    - People: What data-related skills and roles the enterprise requires for the transformation. If the enterprise lacks such resources and skills, the enterprise should consider either acquiring those critical skills or training existing internal resources to meet the requirements through a well-defined learning program.
- Architecture Repository
  Identify what relevant Data Architecture resources are available in the organization's Architecture Repository -- in particular, generic data models relevant to the organization's industry ''vertical'' sector. For example:
    - ARTS has defined a data model for the Retail industry.
    - Energistics has defined a data model for the Petro-technical industry.

Data architecture should include at least one Logical Data Model (LDM), one Physical Data Model (PDM), the mapping between LDM and PDM, the mapping between LDM and applications, and the mapping between LDM and Business Domain Model provided from the Business Architecture analysis.
Generally, a data architect may document the architecture artifacts in level 0 or level 1. For some architecturally significant components, a data architect should consider documenting the architecture at a more detailed level, e.g., level 2 or 3.

3.3.2.2.3 Inputs

- Data and Architecture Standard and Principles
- Existing data architecture documents
- Vendor system data architecture documents
- SME contact information
- Business Domain Model from As-Is Business Architecture Analysis
- Business Capability and Process Analysis documents
- Data Principles (if any)

3.3.2.2.4 Steps

- Identify stakeholders and audience
- Review data and architecture standards and principles
- Collect and review existing As-Is Business Architecture documents, especially the business domain model document
- Collect and review existing Information and Data Architecture documents
- Interview SME, and conduct focus-group discussions if needed
- Document As-Is Information and Data Architecture
- Analyze and identify pain points in Data Architectures
- Conduct formal stakeholder review and sign-off
- Finalize As-Is information and data architectures

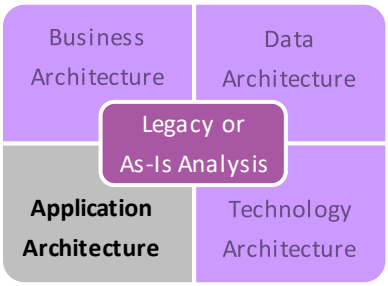
3.3.2.2.5 Outputs

As-Is data architecture analysis document may include:

Note – many of the models will be represented as diagrams.

- Logical Data Model
- Physical Data Model
- Data management process models
- Mapping between LDM and PDM
- Mapping between LDM and Business Domain Model
- Data Entity and Business Function Mapping Matrix
- Data Entity and Application Mapping Matrix
- Multiple viewpoints that help identify key stakeholder concerns. Example viewpoints would include:
    - Data Life Cycle Model
    - Data Security Model
- List of pain points
- Wish list if any

3.3.2.3 *Application Architecture*



3.3.2.3.1 Objective

The objective of this exercise is to identify, analyze and document the existing structure of the current business applications supporting the current business processes and capabilities analyzed in the previous step (business architecture analysis), so that the LM team will be clear on the application architecture current state.

3.3.2.3.2 Approach

Focus on identifying and analyzing the following architecture information by reviewing documents, interviewing SME(s), and conducting focus group discussions, as necessary.

- The architecture of each major application
- The solution architecture of the integrated applications
- The alignment, interaction, and interface among business process and applications
- The functional and non-functional capabilities the applications provided

For application architecture, consider providing at least one static structure view (e.g., component diagram), one dynamic view (e.g., sequence diagram), and any other views necessary to align with various stakeholder's interests or needs.

Generally, an architect may document the architecture artifacts in level 0 or level 1 at current stage. For some architecturally significant components, an architect should consider documenting the architecture at a more detailed level, e.g., level 2 or 3.

3.3.2.3.3 Inputs

- Architecture Principles, Standards and Patterns
- Design documents of existing applications/systems
- Vendor system manual and training documents
- SME contact information
- Business Architecture (Business Model, Capability, Process) Analysis artifacts or document
- As-Is Data Architecture artifacts or document

3.3.2.3.4 Steps

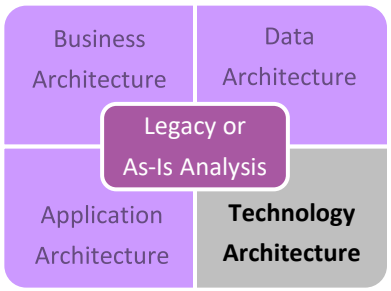
- Identify stakeholders/audience
- Review Architecture Principles, Standards and Patterns
- Collect and review existing Business Architecture documents
- Collect and review architecture documents of the existing applications
- Collect and review existing data architecture
- Interview SME(s), and conduct focus-group discussions if needed
- Document As-Is application and solution architecture
- Analyze and identify pain points in solution and application architectures
- Conduct formal stakeholder review
- Finalize As-Is solution and application architectures

3.3.2.3.5 Outputs

As-Is application architecture document may include:

- The functional and non-functional capabilities the applications provided
- The architecture of each major application
- The solution architecture of the integrated applications
- The mapping information between applications and data
- The structure and mapping information of alignment, interaction, and interface among business process and applications
- The list of pain points
- A wish-list if any

3.3.2.4 *Technology Architecture*



3.3.2.4.1 Objectives

The objectives of As-Is Technology Architecture analysis are to:

- Identify, analyze and document existing technology architecture which enables As-Is application and data architectures
- Identify, analyze and document the pain points of the existing technology architecture
- Identify duplication

3.3.2.4.2 Approach

Focus on identifying and analyzing the following architecture information through reviewing documents, interviewing SMEs, and conducting focus group discussions, as necessary.

- The technology architecture of each major application
- The technology architecture of the integrated solution architecture
- The alignment, interaction, and interface among various applied technology architectures
- The functional and non-functional capabilities the applied technologies provide
- The alignment between technology architecture and, application or data architectures

For the technology architecture, consider providing at least one static structure view (e.g., component diagram), and one dynamic view (e.g., sequence diagram), and any other views necessarily to align with various stakeholders needs or interests.
Generally, an architect may document the architecture artifacts in level 0 or level 1. For some architecturally significant components, an architect may document the architecture at a more detailed level, e.g., level 2 or 3.

3.3.2.4.3 Inputs

- Technology and Product Standard
- Architecture Principles and Patterns
- Design documents of existing systems' technology architecture
- Vendor product or system's manual and training documents
- SME contact information
- Business Architecture (Business Model, Capability or Process) Analysis documents
- Data Architecture Analysis document
- Application Architecture Analysis document

3.3.2.4.4 Steps

- Identify key stakeholders/audience
- Review Architecture Principles, Standards and Patterns
- Review Technology and Product standards
- Collect and review existing Business Architecture documents
- Collect and review existing Solution/Application Architecture documents
- Collect and review existing Information Architecture documents
- Interview SME, and conduct focus-group discussion if needed
- Document As-Is technology architecture
- Analyze and identify pain points in technology architectures
- Conduct formal stakeholder review

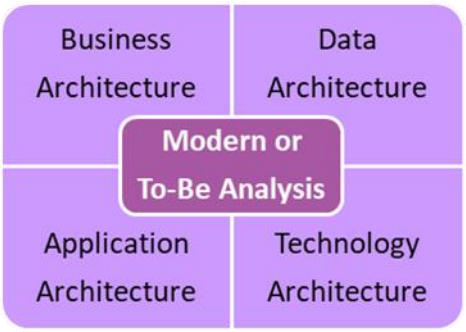
- Finalize As-Is technology architecture

3.3.2.4.5 Outputs

As-Is technology architecture document may include:

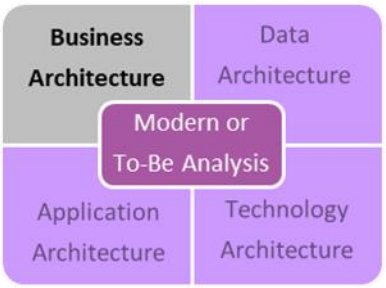
- Infrastructure diagram
- Deployment diagram
- Technology and Product Standards followed
- Networked Computing Hardware diagram
- Communications Engineering diagram
- Environments and Locations diagram
- Platform Decomposition diagram
- The functional and non-functional capabilities the technology architecture provided
- The mapping matrix of technology and application architecture
- The mapping matrix of technology and data architecture
- The list of pain points
- The wish list if any

3.3.3 Modern To-Be Analysis



At this phase, an agency will develop a high-level target (i.e., To-Be) architecture based on the architecture vision statement developed in LM Charter to achieve the business objectives of the LM. The To-Be architecture includes business architecture, application architecture, data architecture and technology architecture.

3.3.3.1 *Business Architecture*



3.3.3.1.1 Objectives

The objectives of Business Architecture analysis are to:

- Develop the To-Be Business Architecture that describes how the agency needs to operate to achieve the business goals and respond to the strategic drivers set out in the Architecture Vision, in a way that addresses the request for LM and stakeholder concerns.
- Identify candidate Architecture Roadmap components based upon gaps between the As-Is and To-Be Business Architectures.

3.3.3.1.2 Approach

The Business Architecture describes the product and/or service strategy, and the organizational, functional, process, information, and geographic aspects of the business environment.

To systematically conduct business architecture development, the following analyzes are to be included:

- **Business Model Canvas analysis**
- **Business Capability analysis**
  It will use the value chain or value stream information from the Business Model Canvas analysis to identify the business capabilities.
- **Business Process analysis**
  It will use the results from Business Capability analysis to identify the business processes, which implement the business capabilities.
- **Business Domain Model analysis**
  Show the relationships between objects as a class diagram. The objects represent business components with their attributes and operations. The model is used to maintain business vocabulary terms and enable clear communication about the parts of the business.
- **Business Application Portfolio Model analysis**
  Utilize the result from Business Process analysis to identify the related business application(s) which support or implement the tasks or activities in the business process. Use the result from the Business Domain Model analysis to provide consistent references and terms throughout.

Generally, a business architect may document the architecture artifacts in level 0 or level 1. For some architecturally significant components, a business architect may document the architecture at a more detailed level, e.g., level 2 or 3.

3.3.3.1.3 Inputs

- To-Be business architecture documents, which may include some of the following:
  - Business principles, goals, and drivers
  - Organizational Model
  - Operation Model
  - Business Model Canvas
  - Business Capability Analysis
  - Business Process Model
  - Roles and Responsibility Model
  - Use Case Model
  - Domain Information Model
  - The list of pain points
  - Wish list if any
- Business Requirement
- Architecture Principles
- Architecture Vision

- Architecture Repository
- Templates
- Constraints
- SME contact information

3.3.3.1.4 Steps

- Identify key stakeholders and audience
- Collect and review
    - As-Is Business Architecture documents
    - Business Requirement
    - Business Architecture Standards
    - Architecture Principles
    - Architecture Vision
    - Architecture Repository
    - Templates
    - Constraints
    - Pain Points
    - Wish List if any
- Select reference models, viewpoints and tools
- Interview SME, and conduct focus-group discussion if necessary
- Design Business Architecture, which may include:
    - Business Model Canvas
    - Business Value Stream or Chain
    - Business Capability Model
    - Business Process
    - Business Domain Model
    - Business Application Portfolio Model
    - Mapping or Matrix of capabilities, processes, and business applications
- Identify mapping or matrix of the pain points addressed by To-Be Business Architecture
- Identify mapping or matrix of the wish list (if any) addressed by To-Be Business Architecture
- Document To-Be business architecture
- Conduct formal stakeholder review
- Finalize To-Be business architecture

3.3.3.1.5 Outputs

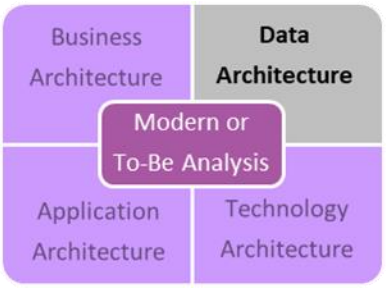
To-Be business architecture analysis document may include:

Note – many of the models will be represented as diagrams.

- Updated Business principles/goals/drivers
- Updated Business Architecture standards
- Updated Business organization and operation model
- Updated Business Model Canvas
- Updated Business Capability Model
- Updated Business Process Model
- Updated Business Domain Model
- Updated Roles and Responsibility Model
- Updated Use Case Model
- Updated Business Application Portfolio Model
- Updated Business Requirements
- Updated Mapping or Matrix between Value Chain, Business Capability, Business Process and Business Application
- Updated Mapping or Matrix of organization and business functions
- The list of pain points it addressed or left
- The wish list (if any) it addressed or left

Note: The guidelines on how to use Business Model Canvas, Business Capability Analysis, Business Process Analysis, and Business Domain Model are the same as those illustrated in section 3.3.2.1 Business Architecture

3.3.3.2 *Data Architecture*



3.3.3.2.1 Objectives

The objectives of To-Be Data Architecture are to:

- Develop the Target Data Architecture that enables the Business Architecture and the Architecture Vision, while addressing the request for LM and stakeholder concerns.
- Identify candidate architecture roadmap components based upon gaps between the As-Is and To-Be Data Architectures.

3.3.3.2.2 Approach

- Follow the enterprise defined data and architecture standards, principles, best practices, and policies.
- Data Management
  - A clear definition of which application components in the landscape will serve as the system of record or reference for enterprise master data.
  - Will there be an enterprise-wide data standard that all application components, including software packages, need to adopt (in the main packages can be prescriptive about the data models and may not be flexible)?
  - Clearly understand how data entities are utilized by business functions, processes, and services
  - Clearly understand how and where enterprise data entities are, created, stored, transported, and reported.
  - What is the level and complexity of data transformations required to support the information exchange needs between applications?
  - What will be the requirement for software in supporting data integration with the enterprise customers and suppliers (e.g., use of ETL tools during the data migration, data profiling tools to evaluate data quality)?
- Data Governance
  - Structure: Whether the enterprise has the necessary organizational structure and the standards bodies to manage data entity (transformation).
  - Management System: Here enterprises should have the necessary management system and data-related programs to manage the governance aspects of data entities throughout its lifecycle.
  - People: What data-related skills and roles the enterprise requires for the transformation. If the enterprise lacks such resources and skills, the enterprise should consider either acquiring those critical skills or training existing internal resources to meet the requirements through a well-defined learning program.
- Architecture Repository
- Identify what relevant data architecture resources are available in the organization's Architecture Repository -- in particular, generic data models relevant to the organization's industry ''vertical'' sector. For example:
  - ARTS has defined a data model for the Retail industry.
  - Energetics has defined a data model for the Petro-technical industry.
- Data architecture should include at least one Logical Data Model (LDM), one Physical Data Model (PDM), the mapping between LDM and PDM, the mapping between LDM and applications, and the mapping between LDM and Business Domain Model provided from Business Architecture analysis.

- Generally, a data architect may document the architecture artifacts at level 0 or level 1. For some architecturally significant component, a data architect should document the architecture at a more detailed level, e.g., level 2 or 3.
- Data Architecture views should correspond to the selected viewpoints, addressing key stakeholders' concerns.

3.3.3.2.3 Inputs

- As-Is Information Architecture documents
- Vendor product or system manual and training documents
- SME contact information
- To-Be Business Architecture
- Business Domain Model
- Data Architecture Principles
- Data Architecture Standards
- Data Architecture Repository
- Data Architecture Requirement
- Business Requirement (Functional and Non-Functional)
- Architecture Vision
- Constraints on data architecture work
- List of pain points in data architecture
- Wish list if any

3.3.3.2.4 Steps

- Identify key stakeholders and audience
- Collect and review
    - Architecture Vision
    - Business Architecture documents
    - Business Requirement
    - Data Architecture Requirement
    - Data Architecture Principles
    - Data Architecture Standards
    - Data Architecture Repository
    - Data Reference Models
    - Constraints
    - Pain points
    - Wish list if any
- Select reference models, viewpoints and tools
- Interview SME, and conduct focus-group discussion if needed
- Design data architecture

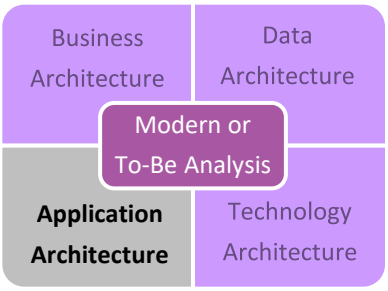
- Identify mapping or matrix between data architecture and business architecture components
- Identify mapping or matrix of the pain points addressed by the data architecture
- Identify mapping or matrix of the wish list addressed by the data architecture
- Resolve impacts across the Architecture Landscape
- Document To-Be data architecture
- Conduct formal stakeholder review
- Finalize To-Be data architecture

3.3.3.2.5 Outputs

To-Be data architecture document may include:

- Validated and updated data architecture principles and standards
- Data Architecture Standards or Pattern applied
- Conceptual Data diagram
- Logical Data Model
- Physical Data Model
- Data Dissemination diagram
- Data Security diagram
- Data Migration diagram
- Data Lifecycle diagram
- Data Flow Diagram
- Data management process models
- Data Entity and Data Component catalog
- Data Entity and Business Function matrix
- Constraints of the data architecture
- The functional and non-functional capabilities the data architecture provided
- The mapping matrix of business and data architecture components
- The mapping or matrix of the pain points addressed by the data architecture
- The mapping or matrix of the wish list addressed by the data architecture
- Updated business requirements, if appropriate
- Updated application requirements, if appropriate

3.3.3.3 *Application Architecture*



3.3.3.3.1 Objectives

The objectives of To-Be Application Architecture are to:

- Develop the target application architecture, describing how the agency's systems will enable the Architecture Vision and Business Architecture, in a way that addresses the request for LM and stakeholders' concerns.
- Identify candidate Architecture Roadmap components based upon gaps between the As-Is and To-Be Application Architectures.

3.3.3.3.2 Approach

- Follow defined architecture standards, principles, best practices, and policies.
- Utilize the relevant assets and artifacts in Architecture Repository, for example:
    - Architecture Patterns and Design Patterns
    - Generic business models relevant to the organization's industry ''vertical'' sector; for example:
        - The TeleManagement Forum (TM Forum) — www.tmforum.org — has developed detailed applications models relevant to the Telecommunications industry.
        - The Object Management Group (OMG) — www.omg.org — has several vertical Domain Task Forces developing software models relevant to specific vertical domains such as Healthcare, Transportation, and Finance.
    - Application models relevant to common high-level business functions, such as electronic commerce and supply chain management.
- Align application architecture with data architecture and business architecture.
- For application architecture, consider providing at least one static structure view (e.g., component diagram), and one dynamic view (e.g., sequence diagram), and any other views necessary to align with various stakeholders' needs or interests.
- For solution architecture, consider having at least one integration architecture view, which should provide at least one static structure view (e.g., integration component diagram), and one dynamic view (e.g., interaction diagram), and any other views necessary to align with various stakeholders' needs or interests.

- Generally, an application architect may document the architecture artifacts in level 0 or level 1. For some architecturally significant components, an application architect may document the architecture at a more detailed level, e.g., level 2 or 3.
- Architecture views should correspond to the selected viewpoints, addressing key stakeholders' concerns.

3.3.3.3.3 Inputs

- Architecture Vision
- Architecture Principles
- Architecture Standards
- Architecture Repository
- Architecture Requirement
- As-Is Application Architecture documents
- Vendor product or system manual and training documents
- Application Portfolio Model
- To-Be Business Architecture
- To-Be Data Architecture
- SME contact information
- Business Requirement (Functional and Non-Functional)
- Constraints on Architecture Work
- Pain point list
- Wish list if any

3.3.3.3.4 Steps

- Identify key stakeholders/audience
- Collect and review:
    - Business Architecture documents
    - Data Architecture documents
    - Business Requirement
    - Architecture Requirement
    - Architecture Principles
    - Architecture Vision
    - Architecture Standards
    - Architecture Repository
    - Application Portfolio Model
    - Templates
    - Constraints
    - Pain Point List
    - Wish list if any
- Select reference models, viewpoints and tools

- Interview SME, and conduct focus-group discussion if needed
- Design application and solution architecture
- Identify a mapping matrix between application and data architecture components
- Identify a mapping matrix between application architecture and business architecture components.
- Identify a mapping matrix of the pain points addressed by To-Be application architecture
- Identify a mapping matrix of the wish list (if any) addressed by To-Be application architecture or any left
- Resolve impacts across the architecture landscape
- Document To-Be application architecture
- Conduct formal stakeholder review
- Finalize To-Be application architecture

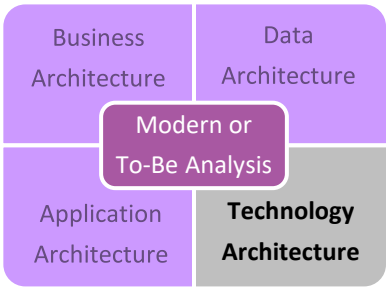
3.3.3.3.5 Outputs

To-Be application architecture document may include:

- Validated application architecture principles, or new principles
- Architecture standards and patterns applied
- Static structure diagram, e.g., architecture overview, component diagram, and class diagram.
- Dynamic diagram: e.g., system process model, sequence diagram, interaction diagram
- System integration diagram
- Applications interoperability model
- Updated application portfolio model
- Interface catalog
- Application and user location diagram
- Application Use-Case diagram
- Process and Application Realization diagram
- Application Migration diagram
- Constraints of the application architecture
- The functional and non-functional capabilities the application architecture provides
- The mapping matrix of business and application architecture components, for example:
    - The mapping matrix of Application and Organization
    - The mapping matrix of Role and Application
    - The mapping matrix of Application and Function
- The mapping matrix of application and data architecture components

- The mapping matrix of the pain points addressed by To-Be application architecture
- The mapping matrix of the wish list (if any) addressed by To-Be application architecture

3.3.3.4 *Technology Architecture*



3.3.3.4.1 Objectives

The objectives of To-Be Technology Architecture are to:

- Develop the To-Be Technology Architecture that enables the LM architecture vision, the application, and data architecture, and addresses the LM request and stakeholders' concerns.
- Identify candidate architecture roadmap components based upon gaps between the As-Is and To-Be Technology Architectures.

3.3.3.4.2 Approach

- Utilize the assets and artifacts in an Architecture Repository, such as,
  - Existing IT services as documented in the IT repository or IT service catalog
  - Technical Reference Model (if any)
  - Generic technology models relevant to the agency's industry ''vertical'' sector
  - Technology models relevant to common systems architectures
- Follow defined technology standards, architecture principles, best practices, and policies.
- Align with application architecture, data architecture, and business architecture
- For technology architecture, consider providing at least one static structure view (e.g., component diagram), and one dynamic view (e.g., sequence diagram), and any other views necessarily to align with various stakeholders' needs or interests.
- Generally, an architect may document the architecture artifacts in level 0 or level 1. For some architecturally significant components, an architect may document the architecture in a more detail level, e.g., level 2 or 3.

3.3.3.4.3 Inputs

- Technology Standards

- Architecture Principles
- Architecture Repository
- Architecture Requirement
- Architecture Vision
- As-Is Technology Architecture documents
- Vendor product/system manual and training documents
- SME contact information
- Business Architecture
- Application Architecture
- Data Architecture
- Business Requirement (Functional and Non-Functional)
- List of pain points
- Wish list if any

3.3.3.4.4 Steps

- Identify key stakeholders and audience
- Collect and review:
    - As-Is Technology Architecture document
    - Business Architecture documents
    - Data Architecture documents
    - Application Architecture documents
    - Business Requirement
    - Architecture Requirement
    - Architecture Principles and Standards
    - Architecture Vision
    - Architecture Repository
    - Templates
    - Constraints
- Select reference models, viewpoints and tools
- Interview SME, and conduct focus-group discussion if needed
- Design Technology Architecture
- Identify a mapping or matrix between application, data architecture, and technology architecture components
- Identify the mapping or matrix of the pain points addressed by To-Be Technology Architecture
- Identify the mapping or matrix of the wish list (if any) addressed by To-Be Technology Architecture
- Document To-Be technology architecture
- Conduct formal stakeholder review
- Finalize To-Be technology architecture

3.3.3.4.5 Outputs

To-Be technology architecture document may include:

- Validated and updated technology principles and standards
- Technology Components and their relationships to information systems
- Technology platforms and their decomposition, showing the combinations of technology required to realize a particular technology ''stack''
- Expected processing load and distribution of load across technology components
- Hardware and network specifications, and physical (network) communications
- Infrastructure diagram
- Deployment diagram
- Networked Computing and Hardware diagram
- Communications Engineering diagram
- Environments and Locations diagram
- Platform Decomposition diagram
- The functional and non-functional capabilities the technology architecture provided
- The mapping matrix of technology and business architecture
- The mapping matrix of technology and data architecture
- The mapping matrix of technology and application architecture
- The mapping or matrix of the pain points addressed by To-Be Technology Architecture
- The mapping or matrix of the wish list (if any) addressed by To-Be Technology Architecture

3.3.4 Strategic Planning

3.3.4.1 *Goal*

Revise expectations of the organization's goal for LM based on the phases of Legacy or As-Is Analysis and Modern or To-Be Analysis. Perform high-level review and document the current understanding of that goal to have a clear, consistent view before moving into the next phases of Strategic Planning: Impact Analysis, Gap and Opportunity Analysis, LM Roadmap creation, and Initial LM Implementation and Migration Planning.

3.3.4.2 *Gap and Opportunity Analysis*

3.3.4.2.1 Objectives

The objectives of Gap and Opportunity Analysis is to identify the difference between the As-Is and To-Be from business architecture, data architecture and technology architecture perspectives, and hence, identify the opportunity to improve the business and systems and add value to the business. It will also provide key inputs for LM roadmap and planning.

3.3.4.2.2 Approach

Use the Gap Analysis Template (shown in Figure 25 below) to systematically identify the gap between As-Is and To-Be architectures from business, data, application, and technology architecture perspectives.

Here is how the Gap Analysis Template works:

- Draw up a matrix with all the Architecture Building Blocks (ABBs or components) of the As-Is Architecture on the vertical axis, and all the ABBs of the To-Be Architecture on the horizontal axis.
- Add to the As-Is Architecture axis a final row labeled ''New'', and to the To-Be Architecture axis a final column labeled ''Eliminated''.
- Where an ABB is available in both the As-Is and To-Be Architectures, check whether there is any difference in sub-level architecture components. If so, record the difference as "gap: enhancement" in the cell, otherwise, record it as "no gap" or "no change".
- Where an ABB from the As-Is Architecture is missing in the To-Be Architecture, it should be reviewed. If it was correctly eliminated, mark it as such in the appropriate ''Eliminated'' cell. If it was not, an accidental omission in the To-Be Architecture has been uncovered, and it must be addressed by updating the To-Be architecture design — mark it as such in the appropriate ''Eliminated'' cell.
- Where an ABB from the To-Be Architecture cannot be found in the As-Is Architecture, record it at the intersection with the ''New'' row as a gap that needs to be filled, either by developing or procuring the building block.

- When the exercise is complete, anything under ''Eliminated'', ''New'' or "Gap: Enhancement" is a gap, which should either be explained as correctly eliminated, or marked as to be addressed by developing/procuring the function.

To-Be Architecture (Building block) / As-Is Architecture (Building block)	Product Search Service	Shopping Cart Service	Online Payment Service	Refund Service	Mobile Payment Service	Online Chatting Service	Confirmation Service	Eliminated
Product Category Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Gap: Eliminated An old service to be eliminated
Product Search Service	No Change	N/A	N/A	N/A	N/A	N/A	N/A	
Shopping Cart Service		No Change	N/A	N/A	N/A	N/A	N/A	
Online Payment Service			No Change	N/A	N/A	N/A	N/A	
Email Confirmation Service	N/A	N/A	N/A	N/A	N/A	N/A	Gap: Enhancement An enhanced service to be developed (e.g. including text messaging to mobile phone confirmation, besides email confirmation)	
New				Gap: New A new service to be developed	Gap: New A new service to be developed	Gap: New A new service to be developed		

Figure 25 - Gap Analysis Template Example

3.3.4.2.3 Input

- As-Is Business Architecture Document
- To-Be Business Architecture Document
- As-Is Data Architecture Document
- To-Be Data Architecture Document
- As-Is Application Architecture Document
- To-Be Application Architecture Document
- As-Is Technology Architecture Document
- To-Be Technology Architecture Document
- Vendor product/system manual and training documents (As-Is and To-Be)
- Architecture Principles (As-Is and To-Be)

- Architecture Standards (As-Is and To-Be)
- Architecture Repository
- Architecture Requirement (As-Is and To-Be)
- Business Requirement (Functional and Non-Functional) (As-Is and To-Be)
- Architecture Vision (As-Is and To-Be)
- Constraints on Architecture Work (As-Is and To-Be)
- SME contact information (As-Is and To-Be)

3.3.4.2.4 Steps

- Gap analysis for Business Architecture based on As-Is and To-Be
- Gap analysis for Data Architecture based on As-Is and To-Be
- Gap analysis for Application Architecture based on As-Is and To-Be
- Gap analysis for Technology Architecture based on As-Is and To-Be
- Gap analysis among To-Be business architecture, To-Be data architecture, To-Be application architecture and To-Be technology architecture. For example;
    - An entity to applications matrix could be produced to validate the mapping. How data is created, maintained, transformed, and passed to other applications, or used by other applications, will now start to be understood. Obvious gaps such as entities that never seem to be created by an application, or data created but never used, need to be noted for later gap analysis.
- Matrix or Relationship Mapping among the gaps of business architecture, data architecture, application architecture, and technology architecture
- Identify candidate architecture components addressing the gaps
- Document the gap analysis, the opportunities identified and candidate architecture components addressing the gaps
- Conduct formal stakeholder review
- Finalize gap and opportunity analysis result

3.3.4.2.5 Outputs

The result of gap and opportunity analysis may include:

- As-Is and To-Be Business Architecture Gap and Opportunity, and the candidate architecture components to address the gaps.
- As-Is and To-Be Data Architecture Gap and Opportunity, and the candidate architecture components to address the gaps.
- As-Is and To-Be Application Architecture Gap and Opportunity, and the candidate architecture components to address the gaps.
- As-Is and To-Be Technology Architecture Gap and Opportunity, and the candidate architecture components to address the gaps.
- Gap and Opportunity Matrix or Mapping among the gaps of business architecture, data architecture, application architecture and technology architecture.

- Summary or List of the identified gaps and opportunities.

3.3.4.3 *Impact Analysis*

3.3.4.3.1 Objectives

The objectives of Impact Analysis are to understand any wider impacts or implications of the LM change from business, data, application, and technology architectures perspectives, and hence, identify the key inputs to LM roadmap and planning from the perspectives of the impacts on coordination with existing or planned services and operations.

3.3.4.3.2 Approach

A general approach is to consider and resolve the impacts across the various architecture landscapes related to the LM program, from business architecture, data architecture, application architecture, technology architecture and program structure perspectives. Each architecture landscape should be examined to identify:

- Does the To-Be Architecture create an impact on any pre-existing architectures?
- Have recent changes been made since conducting the As-Is analysis that impact the To-Be Architecture?
- Are there any opportunities to leverage work from this To-Be Architecture in other areas of the organization?
- Does this To-Be Architecture impact other projects (including those planned as well as those currently in progress)?
- Will this To-Be Architecture be impacted by other projects (including those planned as well as those currently in progress)?
- What are the impacts caused by the changes on each of the initial To-Be architectures (i.e., business, data, application, and technology architectures) as result of the impact analysis listed above? A sample template is shown below.

Initial To-Be Architecture / Change on To-Be Architecture	To-Be **Business** Architecture	To-Be **Data** Architecture	To-Be **Application** Architecture	To-Be **Technology** Architecture
Change on To-Be **Business** Architecture (e.g., new business entity needed)		New entity added; ER diagram updated needed	DAO layer update needed	No impact
Change on To-Be **Data** Architecture (e.g., new type of data needed)	No impact		DAO layer update needed	No impact
Change on To-Be **Application** Architecture (e.g., new functions needed)	No impact	No impact		New vendor product added
Change on To-Be **Technology** Architecture (e.g., new technology needed to support new data and functionality)	No impact	No impact	API management interface update needed to align with new API management vendor product	

Figure 26 - Impact Analysis Template Sample

3.3.4.3.3 Inputs

- As-Is and To-Be Architectures documents (for business architecture, data architecture, application architecture, and technology architecture)
- List of changes (if any) on architecture principles, standards, best practices, or policies
- List of recent relevant changes (due to other projects or programs) on business architecture, data architecture, application architecture and technology architecture
- Related As-Is Architecture for business, data, application and technology, which are not in the scope of the LM program but are associated with the architecture landscape in the scope of LM
- List of projects in progress
- List of projects planned but not started yet

3.3.4.3.4 Steps

- Analyze impacts from any recent changes on architecture principles, standards, best practices or policies on each previously planned: To-Be business architecture; To-Be data architecture; To-Be application architecture; and To-Be technology architecture

- Analyze the impacts from other relevant on-going or starting projects or programs on each previously planned: To-Be business architecture; To-Be data architecture; To-Be application architecture; and To-Be technology architecture
- Analyze impacts from any recent changes on To-Be architecture on each previously planned: To-Be business architecture; To-Be data architecture; To-Be application architecture; and To-Be technology architecture
- Analyze To-Be business architecture's impacts across the LM landscape
- Analyze To-Be data architecture's impacts across the LM landscape
- Analyze To-Be application architecture's impacts across the LM landscape
- Analyze To-Be technology architecture's impacts across the LM landscape
- Document the impacts
- Conduct formal stakeholder review
- Finalize impact analysis result

3.3.4.3.5 Outputs

- To-Be Business Architecture impacts analysis document
    - Impacts on existing architectures
    - Recent changes (e.g. on architecture principles, standards, or other To-Be architectures) made that impact the To-Be business architecture
    - Opportunities to leverage To-Be business architecture in other areas
    - Impacts on other projects
    - Other projects impact on the To-Be business architecture
- To-Be Data Architecture impacts analysis document
    - Impacts on existing architectures
    - Recent changes (e.g. on architecture principles, data standards, or other To-Be architectures) made that impact the To-Be data architecture
    - Opportunities to leverage To-Be data architecture in other areas
    - Impacts on other projects
    - Other projects impact on the To-Be data architecture
- To-Be Application Architecture impacts analysis document
    - Impacts on existing architectures
    - Recent changes (e.g. on architecture principles, standards, or other To-Be architectures) made that impact the To-Be application architecture
    - Opportunities to leverage To-Be application architecture in other areas
    - Impacts on other projects
    - Other projects impact on the To-Be application architecture
- To-Be Technology Architecture impacts analysis document
    - Impacts on existing architectures
    - Recent changes (e.g. on architecture principles, technology standards, or other To-Be architectures) made that impact the To-Be technology architecture
    - Opportunities to leverage To-Be technology architecture in other areas

    - Impacts on other projects
    - Other projects impact on the To-Be technology architecture
- Impact Matrix between changed (initial) To-Be architecture in business, data application and technology due to the above impact analysis on the initial To-Be architectures. Refer to Figure 26 - Impact Analysis Template Sample for an example.
- Updated To-Be architectures (in business, data, application, and technology).

3.3.4.4 *Legacy Modernization Roadmap*

3.3.4.4.1 Objectives

The objectives of Roadmap are to:

- Generate the initial version of the roadmap, based upon the gap and impact analysis and candidate architecture roadmap components from previous business architecture, data architecture, application architecture, technology architecture, and gap analyses
- Determine whether an incremental approach is required, and if so, identify Transition Architectures that will deliver continuous business value
- Prioritize activities over the coming LM transformation phases
- Support the definition of a high level consolidated, cross-discipline LM execution plan
- Support a more detailed definition of consolidated, cross-discipline LM plan within the phase of Modernization Planning at the stage of Planning and Funding

3.3.4.4.2 Approach

- Take into account the complete set of impacts and gaps between the As-Is and To-Be architectures in all architecture domains, and logically group changes into work packages within the agency's portfolios. This is an effort to build a best-fit roadmap that is based upon the stakeholder requirements, the agency's business transformation readiness, identified opportunities and solutions, and identified implementation constraints. The key is to focus on the final target while realizing incremental business value.
- The following four concepts are key to transitioning As-Is to a To-Be modernization state: Architecture Roadmap; Work Packages; Transition Architectures; and Implementation and Migration Plan:
    - The Architecture Roadmap lists individual work packages in a timeline that will realize the To-Be architecture.
    - Each work package identifies a logical group of changes necessary to realize the To-Be architecture.
    - A Transition Architecture describes the agency at an architecturally significant state between the As-Is and To-Be architectures. Transition Architectures provide interim To-Be architectures upon which the organization can converge.

    - The Implementation and Migration Plan provides a schedule of the projects that will realize the To-Be architecture.
- The level-of-detail addressed at this phase will depend on the scope and goals, but it is relatively high.
- Utilize the "Portfolio Analysis: Risk, Reward, Time, and Money" prioritization tool to identify the priorities of various work packages in the roadmap. The prioritization approach is illustrated in section Prioritization with Portfolio Analysis: Time, Money, Risk, Reward".

3.3.4.4.3 Inputs

- As-Is and To-Be Architecture documents, including (business architecture, data architecture, application architecture, and technology architecture).
- Impact analysis document
- Gap analysis document
- Business Requirements
- Constraints
- Planning Methodologies
- Governance and support strategy and framework
- Agency Business Planning model and framework
- Portfolio, Program, Project Management model and framework

3.3.4.4.4 Steps

- Determine and confirm key corporate change attributes
- Determine business constraints for implementation
- Review and consolidate gap and impact analysis results
- Review consolidated requirements across related business functions
- Consolidate and reconcile interoperability requirements
- Refine and validate dependencies
- Confirm readiness and risk for business transformation
- Formulate Implementation and Migration Strategy
- Define or validate candidate roadmap components in business architecture
- Define or validate candidate roadmap components in data architecture
- Define or validate candidate roadmap components in application architecture
- Define or validate candidate roadmap components in technology architecture
- Identify and group major work packages
- Identify Transition Architectures
- Prioritize components and activities in the phases of the roadmap through utilizing prioritization tool described in section Prioritization with Portfolio Analysis: Time, Money, Risk, Reward
- Create the LM Roadmap (refer to section 3.3.4.4.7 Modernization Plan Diagram)
- Conduct a formal stakeholder review

- Finalize the LM Roadmap

3.3.4.4.5 Outputs

- Refined and updated version of LM Vision
- Refined and updated version of To-Be Architecture, including business, data, application, and technology architectures
- LM Roadmap may include:
  - Roadmap diagram and description
  - Work package portfolio:
    - Work package description (name, description, objectives)
    - Functional requirements
    - Dependencies
    - Relationship to opportunity
    - Relationship to architecture definition document and architecture requirements specification
    - Relationship to any capability increments
    - Business value
    - Implementation Factor Assessment
    - Impact
  - Identification of Transition Architectures, if any:
    - Transition Architecture diagrams (business architecture, data architecture, application architecture, and technology architecture.)
  - Implementation recommendations:
    - Criteria measures of effectiveness
    - Risks, issues, and mitigation approaches
  - Implementation and Migration Strategy
  - The outputs may also include some or all the following diagrams:
    - Project Context diagram
    - Benefits diagram

3.3.4.4.6 Prioritization with Portfolio Analysis: Time, Money, Risk, Reward

Overview of Capability Priority Assessment

The Modernization Guide leverages the Business Capability as the unit of measure for Strategic Planning and Prioritization. Here is a suggested prioritization framework that presents a visual model for estimating where each capability stands relative to the four attributes of:

- **Time**
  Would modernizing the capability take a short or long time to complete? A shorter schedule would receive a higher priority.

- **Money**
  How expensive is the modernization of the capability projected to be in comparison to the total budget of the business? A lower cost alternative within the available budget would receive a higher priority.
- **Risk**
  This could be a composite of one or more risks rated according to each risk's impact, probability, and controllability to mitigate or avoid the risk. A capability would receive a higher ranking if its risk rating were low (low impact to the business, low probability of occurrence, highly controllable and manageable) making it favorable to prioritize. Unless the high-risk rating reflects the negative impacts of not addressing the capability, in which case a higher risk could receive a higher priority. Refer to the Project Delivery Framework Risk Register for guidance in rating risks. Consider the example below. Capability #4 may have been scored higher because there is less risk to implement compared to capability #1 or it may have been scored higher because the risk of not addressing capability #4 would result in higher impact to the business than not addressing capability #1.
- **Reward**
  If the modernization process succeeds, how much added value, e.g., savings or time efficiency, is it projected to provide? A higher reward would receive a higher priority.

The following is an example of a prioritization evaluation matrix.

Factor	Rubric Criteria
Time	Shortest = 5, Longest = 1
Money	Lowest Cost = 5, Highest Cost = 1
Risk	Lowest = 5, Highest = 1 (However, a high-risk scenario could be given a high priority)
Reward	Highest = 5, Lowest = 1

Theme	Capability	Approach	Category	Raw Score	Weight Factor	Weighted Score	Year
Operations	#1	Modernize	Time	1.0	1.0	1.0	Y2
Operations	#1	Modernize	Money	1.0	1.0	1.0	Y2
Operations	#1	Modernize	Risk	4.0	.5	2.0	Y2
Operations	#1	Modernize	Reward	3.0	1.0	3.0	Y2
Financial	#4	Integrate	Time	2.0	1.0	2.0	Y1
Financial	#4	Integrate	Money	2.0	1.0	2.0	Y1
Financial	#4	Integrate	Risk	5.0	.5	2.5	Y1
Financial	#4	Integrate	Reward	3.0	1.0	3.0	Y1

Each value can be weighted. For example, if Risk is most important to a business, risk can be multiplied by 1.0 and all other values by 0.8. Or, conversely, if Time is less important, it can be weighted and multiplied by 0.5 while all other values remain at 1.0. The important thing is to keep the same weighting across all capabilities, so prioritization can be consistent.

An Excel spreadsheet for assessing capability priorities and plotting the results on a Priority Quadrant is available on the Legacy Modernization website and is included in the Package of LM Guide Appendix materials.

Priority Quadrant

Once the four attributes of Time, Money, Risk, and Reward are considered, the values are placed on a quadrant to assist in measuring priority. An example quadrant is shown in the Figure 27 below. The calculated area of the inner diamond created by the attribute coordinates is indicative of its overall priority rating. The more area taken up, the higher the priority of the related modernization approach.

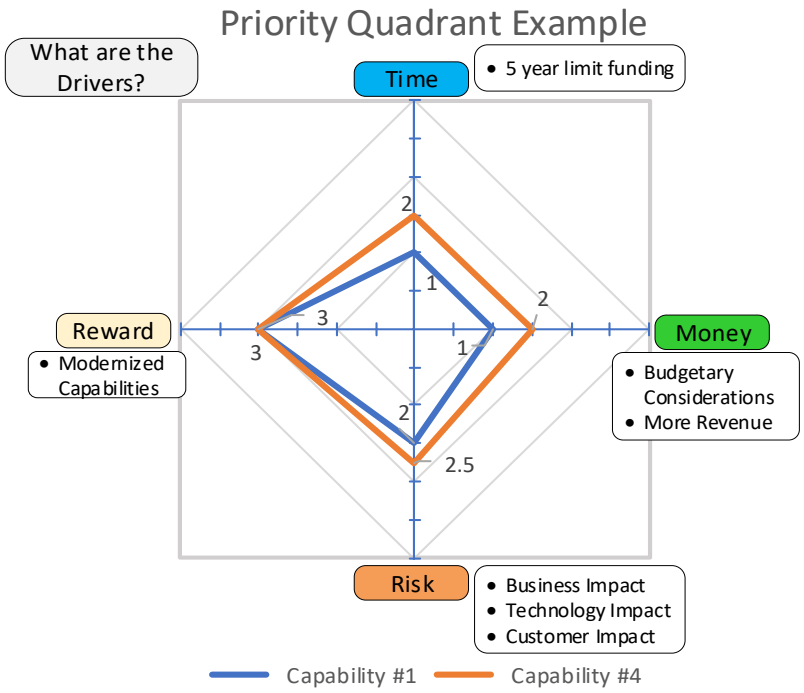


Figure 27 - Priority Quadrant Example

Role in the Modernization Strategy

Once the priorities of all business capability related modernizations have been assessed, it is possible to schedule when they should occur based on how many resources a business has at different times. This schedule is represented in the following phase: Modernization Plan Diagram.

3.3.4.4.7 Modernization Plan Diagram

Overview of Modernization Plan Diagram

The Modernization Plan Diagram provides a high-level (level 0) timeline to a business' backlog. It presents what capabilities will be acted upon, and when. The overall actions on a capability's underlying business applications are represented along a timeline. These capabilities are further categorized by the overall TIME actions to be performed on their related business applications. Recall the TIME categories from section 2.4.2 Legacy Status via color-coding: Tolerate, Invest/Innovate/Integrate, Migrate/Modernize, and Eliminate.

All capabilities are organized vertically in three ways:

1. **Epics** (refer to section Agile Terminology: Backlog, Agile, and Stories)
2. **Business Theme**, e.g., "Operations" or "Financing"
3. **Priority** (refer to the section Priority Quadrant)

The following graphic is a condensed view of the Modernization Plan Diagram in a four-year modernization plan.

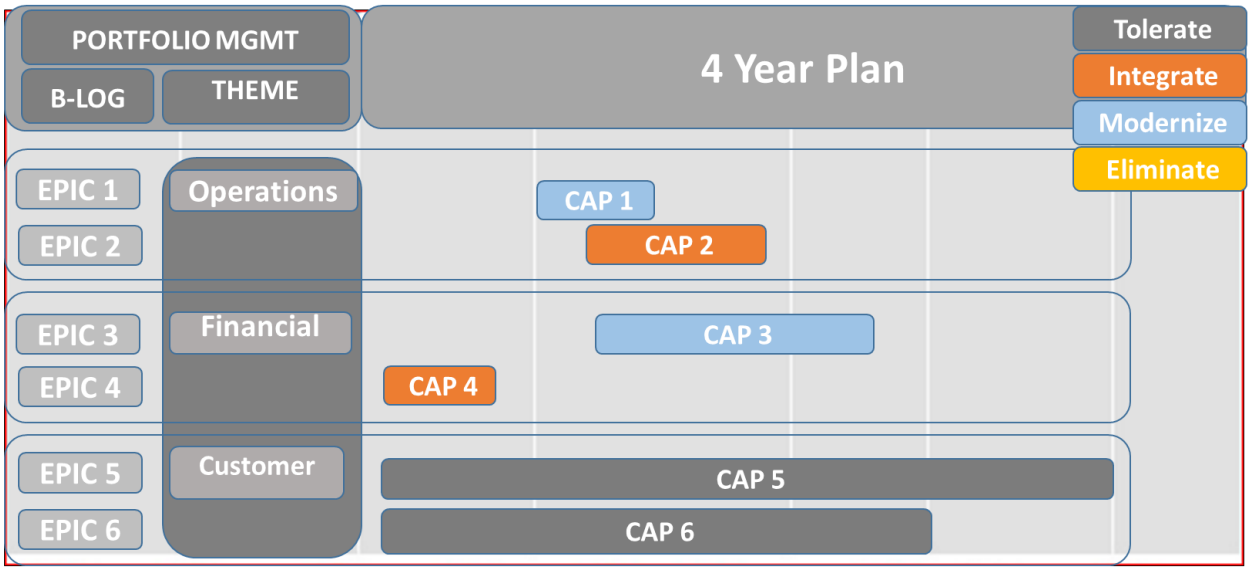


Figure 28 - Legacy Modernization Plan Diagram Example

A more comprehensive diagram an agency may use to develop a roadmap is a Legacy Modernization Plan Overview diagram (Figure 29 - Legacy Modernization Plan Overview Diagram Example below). In its full four-year form, the document could represent all four phases of the LM Project (Due Diligence, Planning and Funding, Transformation, and Production).

The goal of this diagram is to address how LM impacts:

1. **Business Applications**
   A combination of applications and hardware components to enable a business capability and the timing to achieve modernization.
2. **Organizational Transformation**
   LM could have a significant impact on the organization and how work will be performed in the To-Be state. Training and agency-wide informational events will be the most common organizational transformation activities.
3. **Communication**
   Planned Internal and external communications. It might not be feasible to represent every planned communication event on this diagram. However, any major events that would be included in a Communications Plan, such as the Kick-off Meeting and Go-Live announcements, can be represented.

The diagram example on the following page is provided in the form of an accompanying Visio document.

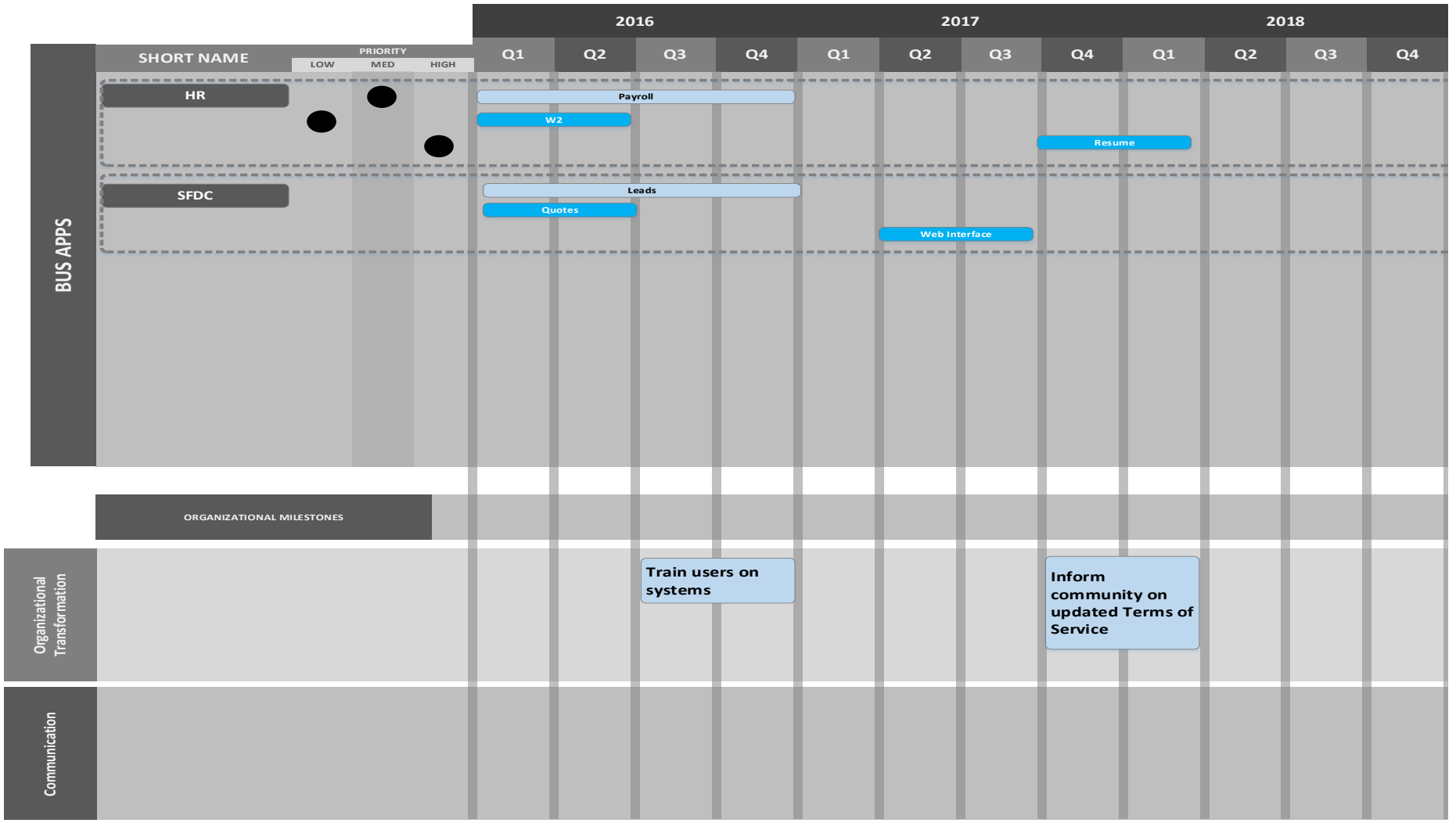


Figure 29 - Legacy Modernization Plan Overview Diagram Example

Role in the Modernization Strategy

The Modernization Plan Diagram and Overview Diagram combine to provide the final enabling pieces of the Due Diligence phase. They provide the information to support the development of LM Planning in the next stage, Planning & Budgeting, which will allow for tracking when modernization on certain capabilities occurs and provides insight on the responsibility of different teams throughout the modernization timeline. The diagrams present all high-level modernization-impacted capabilities and business applications, their priorities, and the special considerations necessary for their processes represented in the internal/external communication area.

3.3.4.5 *Initial Legacy Modernization Implementation and Migration Planning*

3.3.4.5.1 Objectives

The objectives of LM Implementation and Migration Planning are to:

- Finalize the Roadmap
- Coordinate integration of the Roadmap with the agency's enterprise change portfolio
- Ensure that the business value and cost of work packages and Transition Architectures is understood by key stakeholders
- Finalize the initial Implementation and Migration Plan

3.3.4.5.2 Approach

- The focus is the creation of an initial Implementation and Migration Plan in co-operation with the portfolio and project managers.
- Based on the Roadmap to develop the initial Implementation and Migration Plan that address the request for LM.
- The initial Implementation and Migration Plan are integrated with the agency's other change activities.
- Activities include assessing the dependencies, costs, and benefits of the various migration projects within the context of the agency's other activities.
- The Implementation and Migration Plan will include initial high-level portfolio and project-level information.
- At the phase of strategic planning in Due Diligence stage, an agency may only develop an initial high-level version of implementation and migration planning, which will become the key input to the phase of planning in Planning & Funding stage, in which an agency will develop the next version of implementation and migration planning with sufficient detail to support funding application and approval process, and transformation stage.

3.3.4.5.3 Inputs

- LM Roadmap
- Gap and Impact Analysis Report
- As-Is and To-Be Architecture documents, including (business architecture, data architecture, application architecture, and technology architecture).

3.3.4.5.4 Steps

- Review and analyze To-Be architecture, transition architectures, gap and impact analysis documents and roadmap document
- Confirm management frameworks (e.g. change management, communication management, project management, enterprise interactions, planning) for Implementation and Migration Plan
- Assign a business value to each work package
- Estimate resource requirements, project timings, and availability and delivery vehicle
- Prioritize the migration projects through the conduct of a cost vs. benefit assessment and risk validation
- Complete the initial Implementation and Migration Plan
- Conducted formal stakeholder review
- Finalize the LM Implementation and Migration Plan

3.3.4.5.5 Outputs

- Implementation and Migration Plan may include:
    - Implementation and Migration Strategy
    - Project and portfolio breakdown of the implementation:
        - Allocation of work packages to project and portfolio
        - Capabilities delivered by projects
        - Relationship to To-Be Architecture and any Transition Architectures
        - Milestones and timing
        - Work breakdown structure (estimated)
        - Related work packages (estimated)
        - Business value
        - Risk, issues, assumptions, dependencies
        - Resource requirements and costs
        - Benefits of migration
        - Estimated costs of migration options
- Finalized To-Be Architecture, including business, data, application and technology architectures
- Finalized Transition Architectures, if any, including business, data, application, and technology architectures
- Finalized Architecture Roadmap
- Finalized Initial Business and Technology Requests (Functional and Non-Functional)
- Implementation Governance Model (if any)

4 Next Steps for the Agency

After the stage of Due Diligence, an agency will need go through the three stages left to accomplish the LM. They are Planning and Funding, Transformation, and Production, and will be briefly illustrated in this section. It is also referenced in Figure 5 - Legacy Modernization Approach Overview (Level 0) in section 3.1.2 and Figure 10 Legacy Modernization Approach (Level 1) in section 3.3.1. For each stage, DIR will provide support to an agency through consulting service provided by an engaged enterprise architect. DIR will also provide an agency appropriate assets and tools to enable its LM execution in a more efficient and effective way.

4.1 Planning and Funding

The objective of this stage is to develop an implementation and migration plan with sufficient detail to submit a budget and request funding needed for the LM program.
There are two phases on this stage.

- **Migration Planning:**
  - In this phase, an agency will use the relatively high-level detail of the LM Roadmap and the Initial Implementation and Migration Plan, which are developed in the last phase (Strategic Plan) of the first stage (Due Diligence), to develop an implementation and migration plan with an appropriate level-of-detail sufficient for submitting a budget.
  - The outputs will be a Context Diagram, the Business Case(s), and one or more Project Charters. Some agencies might defer creating their project charter until after the agency has been notified that the project funding has been secured.
  - For a more detailed guidance on planning, please refer to Initial Legacy Modernization Implementation and Migration Planning.
- **Funding Request:** Based on the implementation and migration plan, an agency will develop an appropriate program structure, and budget structure in a request for sufficient funding to support the execution of the LM planned.

4.2 Transformation

The objective of this stage is to execute the LM transformation and implement the To-Be architectures successfully.
There are three phases on this stage with multiple disciplines. The three phases are requirements collection and analysis, detailed design, and modernization development. The design and development of the LM may include both business (e.g., organization, operation, process) and technology (e.g., application, data) perspectives. The multiple disciplines include agile project management, multi-iteration and multi-phase releases, risk management, change management, and retirement management.

4.3 Production

The objective of this stage is to proactively maintain the released target production solution in a modern state to ensure it performs to realize the value stakeholders expected and prepare for a next wave of modernization when necessary.

There are four disciplines in this stage. The systems in the modern state should be monitored and their performance should be measured and reported to stakeholders to show the alignment with the stakeholders' expected business value. As with any other IT systems, the modern systems require proactive support to ensure they work appropriately to support their business. There will be three levels of updates on the modern systems:

1) regular production support updates for fixing minor bugs, or conduction of minor enhancement per users' feedback. This work will be covered by the regular production maintenance budget.

2) An evolution of the product with a new major version release. This will require formal planning and budgeting approval.

3) A next wave of modernization, which will require an agency to go through full life cycle of LM again.

5 Legacy Modernization Use Case

This is a high-level use case for the due-diligence stage of LM. It is based on the strategic analysis and planning for a real modernization project at a Fortune 500 company. To maintain the company's privacy the company has been renamed "XY" and any sensitive or proprietary information were removed. However, the basic information is kept in the use case for illustrative purposes. In future releases of the modernization guide a use case will be created based on an LM program implemented in a Texas state agency.

5.1 Background

An industry-leading Fortune 500 company named XY and headquartered in the USA, needs to understand, assess, and define its eCommerce strategy, and constructively design an appropriate roadmap to modernize its IT systems and operation to enable and support eCommerce more efficiently. The company assigned this task to an **eCommerce Strategic Planning** project team, the "**ESP** team".

5.2 Legacy Modernization Charter

In the first week the ESP team defined the modernization charter which is summarized in the following sub-sections for illustrative purpose.

5.2.1 Purpose and Objectives

5.2.1.1 *eCommerce Vision*

The eCommerce vision is to empower the company with solid, modern, eCommerce technology and business solutions so that the company can be transformed into the eCommerce era and execute e-business efficiently. To support the vision, an Architecture Vision has been established to:

- Use modern eCommerce technologies and system architecture, such as, Web, SOA, MDM, Business Intelligence, etc. to --
    - Make eCommerce systems and processes easier to be integrated
    - Improve eCommerce system's accessibility and availability
    - Align eCommerce system with ecommerce business operation better
- Enable the company to provide reliable, sustainable, flexible, and cost-effective eCommerce service to its consumers and business partners. Therefore, it will improve its top and bottom lines significantly.

5.2.1.2 *Modernization Purpose*

- Confirm the business and technology strategies support the eCommerce project initiatives into next five years.
- Align Management Information Systems (MIS) objectives with the eCommerce business operational drivers.
- Define an eCommerce governance model to better manage data, integration, and support.

5.2.2 Scope

- Focus on MIS applications and the integration layer between the front-end web applications
- Coordinate with the related front-end web applications initiatives being performed by the Technical Operations
- As-Is, To-Be, and Gap Analysis of eCommerce related system from business and MIS perspectives
- High-Level eCommerce Governance Model from a MIS Perspective
- High-Level Roadmap and Plan for next-three-year's eCommerce program

5.2.3 Deliverables

- High-Level Summary of As-Is State
- High-Level Summary of To-Be State
- Gap and Opportunity Analysis
- eCommerce Roadmap and Plan
- eCommerce Governance Model

5.2.4 RACI, Activities and Deliverables

The following diagram shows a part of the RACI for illustrative purposes.

R = Responsible (Develop & deliver the work, numbers indicate level of responsibility, e.g., 1=primary)
A = Accountable (approves the document)
C = Consulted (provides SME expertise)
I = Informed (notified)

		Activities	Deliverables	Principals	Project Manager	Business Analyst	Tech Lead	eCommerce SME	SAP MDM SME
1.0 Project Planning and As-Is Analysis (1 week)									
	1.1	Project Plan	Project Plan	C	A/R1	R2	R2	C	C
	1.2	Finalized Approach and Templates		I	A/R1	R2	R2	C	C
	etc.	etc.	etc.						
2.0 Information Gathering (4 weeks)									
	2.1	Confirm Business/IT Drivers/Risks (As Is and To Be)	Business and IT Drivers and Risks	I	A	R		C	
	2.2	Understand XY's Current Application Functionality, Technologies, and Infrastructure (As Is and To Be)	High-Level Summary of Current State Functionality, Technologies, and Infrastructure	C	A	R2	**R1**	C	C
	etc.	etc.	etc.						
3.0 Analysis (3 weeks)									
	3.1	Identify Initiatives to Support Strategies and Drivers and to Address Gaps (with Business Groups, WHEAS, and Tech Ops)		C	A/R2	R1	C	C	C
	3.2	Define High-Level eCommerce Governance Model, including SOA	High-Level eCommerce Governance Model	I	A	R		C	C
	etc.	etc.	etc.						
4.0 Develop Recommendations (2 weeks)									
	4.1	Create Information and System Actions Plan and Prioritized Initiatives List	Information and System Actions Plan	C	A/R3	R1	R2	C	C
	4.2	Identify Quick Wins	Quick Wins List	C	A/R	C	C	C	
	etc.	etc.	etc.						

Figure (Use Case) 1 - RACI Table Sample

5.2.5 Due-Diligence Stage Project Plan Overview

The following diagram shows the major activities and timeline at due-diligence stage.

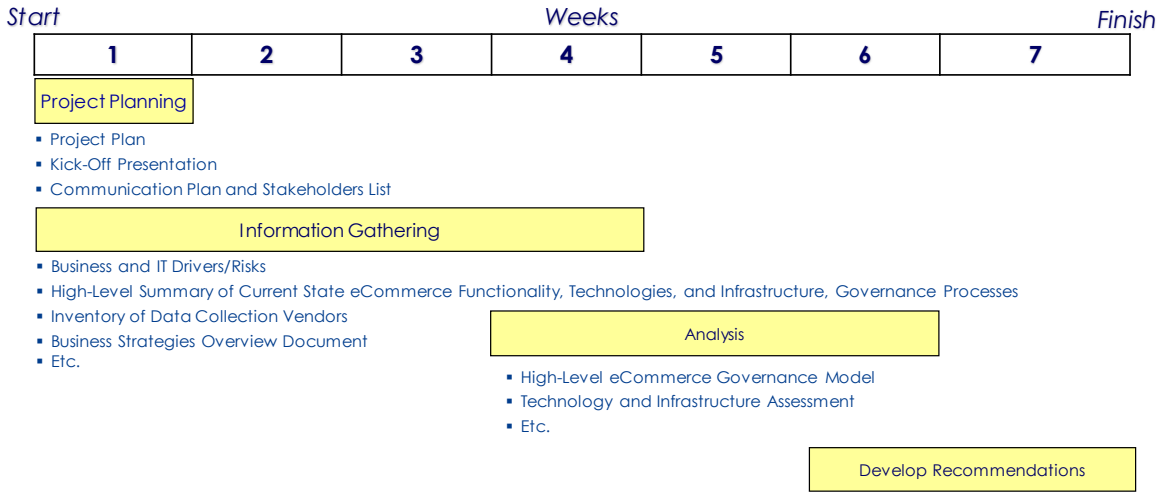


Figure (Use Case) 2 - Due-Diligence Stage Project Plan Overview Sample

5.2.6 Assumptions

- The following groups will participate in the analysis:
  - Application System Business Group
  - Home Business Group B (Digital Distribution, Marketing, Sales, etc.)
  - Technical Operations
- 3rd Party business partners will not participate in the project -- there will be three phone calls with specific partners

- The analysis will include Domestic and International

5.3 Legacy As-Is Analysis

After the ESP team completed its legacy As-Is analysis, it created an As-Is analysis report. The following four sub-sections illustrate the major content of that report.

5.3.1 Biz Arch

5.3.1.1 *Organizational and Operational Structure*

The diagram below depicts the current organization structure with regards to eCommerce. The major pain paints are:

- Multiple touch points and the multiple chains of command
- No formal structure for communication development cooperation approach

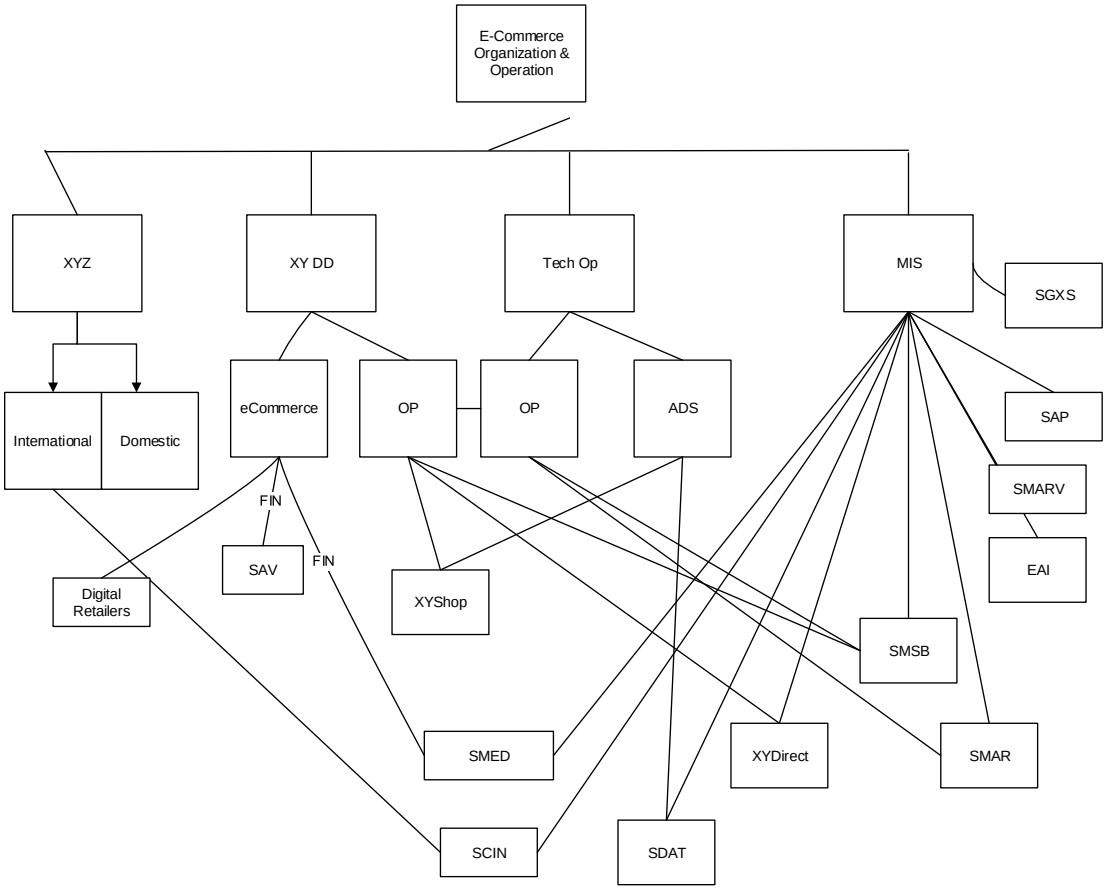


Figure (Use Case) 3 - As-Is eCommerce Organization and Operation Structure Overview Sample

Information about the diagram above is provided in more detail below:

- XYZ is a business unit for managing business with large retailers using XYDirect B2B systems. It will go through WBDD's operations to work with XYDirect.
- XYDD is a business unit for managing digital distribution business.
- XYDD's operations group will work with XYDirect from the business side, and MIS will manage XYDirect from the technology side.
- Tech Op's ADS (advanced digital service) develop/manage XYShop (B2C system), and XYDD's operations group will manage XYShop from the business side.

5.3.1.2 *Significant Business Process Use Cases*

Due to the limited strategic planning project time, the ESP team identified, analyzed, and documented about 8 significant As-Is business cases and processes, each of which is documented in a detailed use case document.

#	Name	MegaProcess
1	eCommerce Strategy UseCase B2C Digital	XYShop.com
2	eCommerce Strategy UseCase B2C Consumer Products	XYShop.com
6	eCommerce Strategy UseCase B2M – Marketing/Radio	XYDirect.com
7	eCommerce Strategy UseCase Digital B2B iTunes	Digital
etc	etc	etc

Figure (Use Case) 4 - As-Is Business Process Use Case List Sample

For illustrative purpose one of the business processes use cases is shown in the following section with abbreviated information.

5.3.1.2.1 eCommerce Strategy As-Is Use Case B2M

The Business to Marketing Process (B2M) describes the flow of transactions and data between systems because of the online acquisition of a XY Marketing Data by online consumers. This use case covers, at a high level, how the transaction is routed between systems and the various outcomes. If all validation points are satisfied, the transaction will be recorded, the order fulfilled, and the data made available to the initiating system and ultimately the consumer. If any validation rule fails, an exception will be generated to at least one exception category.

Use Case Diagram

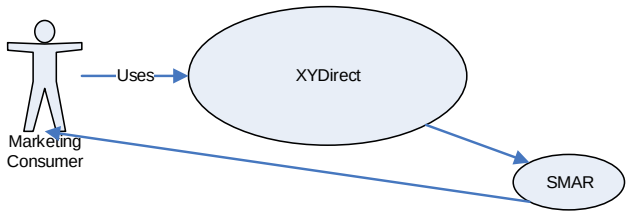


Figure (Use Case) 5 - Use Case B2M Diagram Sample

Process Flow Diagram

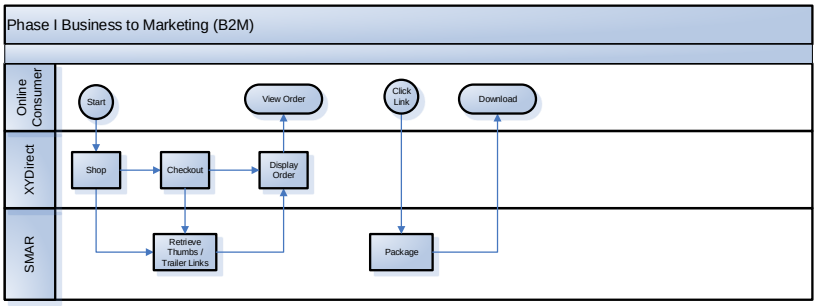


Figure (Use Case) 6 - B2M Process Flow Diagram Sample

5.3.2 Data Arch

As there was another team, the enterprise data architecture team, responsible for data architecture, such as LDM, PDM, etc., the ESP team focused on a high-level information flow within the overall eCommerce system. The diagram below depicts the current system model which has evolved over time through project-based development to meet immediate needs. The major pain points are:

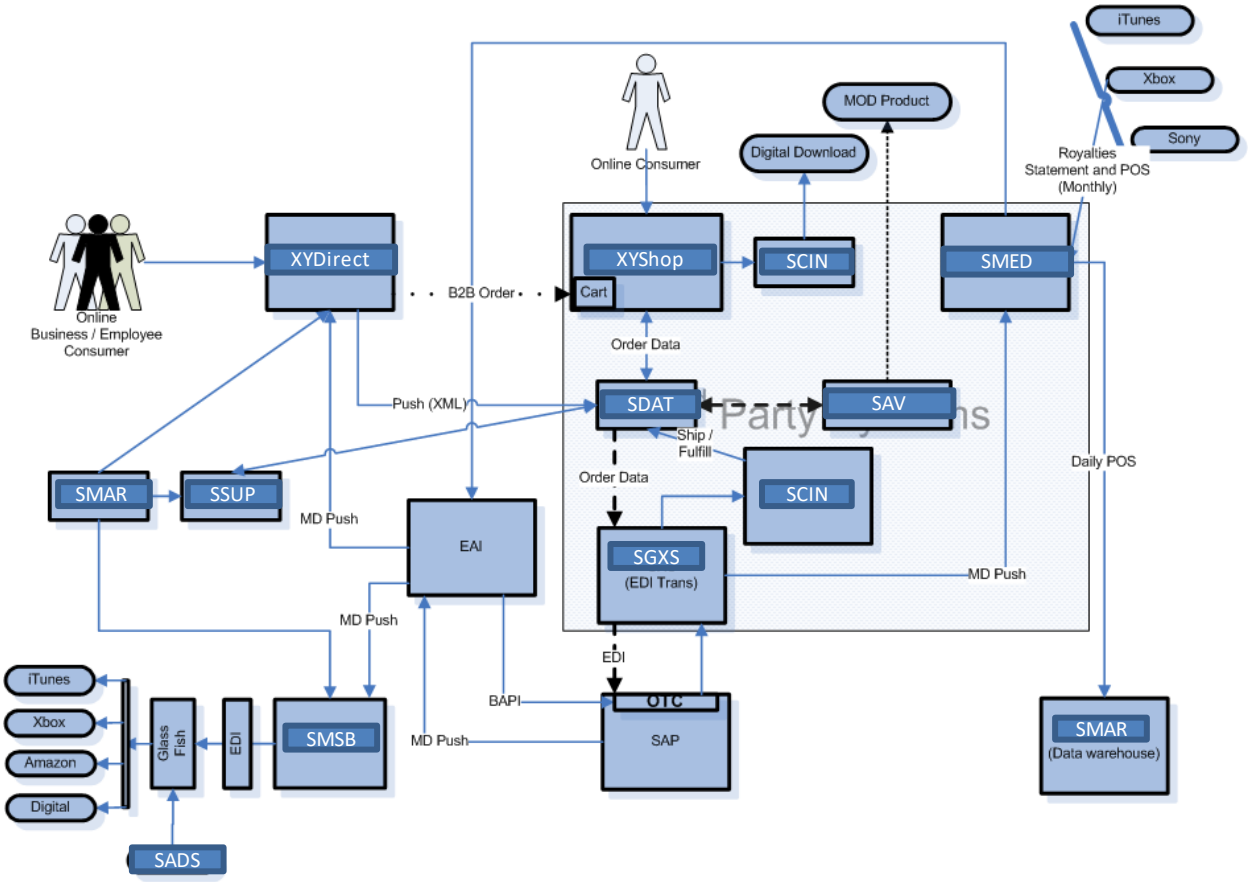


Figure (Use Case) 7 - eCommerce As-Is System and Information Flow Sample

- The disjointed model is not easy to scale/extend, or to be agile to meet "Fast to Market" business requirement
- Lack of formal eCommerce common asset management

5.3.3 App Arch

Due to project time constraints, the ESP team developed a high level As-Is eCommerce system logical view (Figure (Use Case) 8), and leave more detail to the technical architecture view, which is illustrated in the next section.

The major pain points in As-Is eCommerce system are:

- Many point-to-point integrations
- Inconsistent data across various systems due to no formal MDM practice
- Multiple views of XY to Consumers and Retailers
- Multiple data access points to both internal and external users

5.3.4 Tech Arch

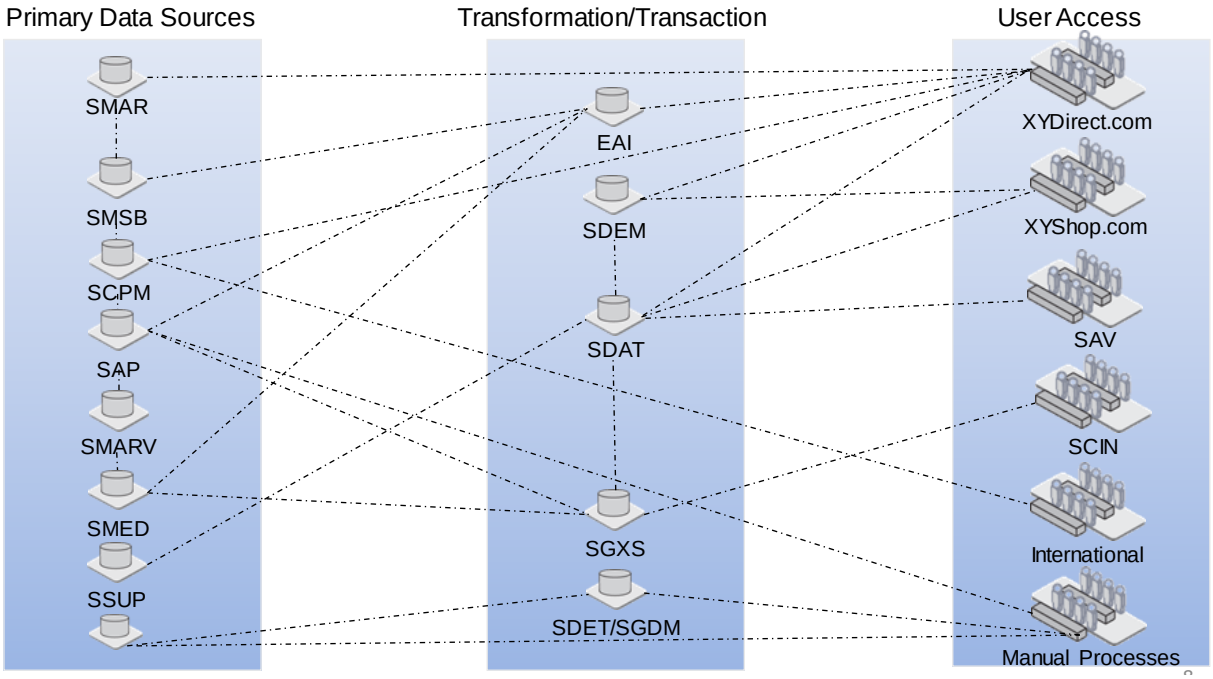


Figure (Use Case) 8 - eCommerce As-Is System Concept View Sample

5.3.4.1 *As-Is eCommerce System Technology Architecture*

- The ESP team also developed a high level As-Is eCommerce system technology architecture (Figure (Use Case) 9). Here are illustrative components from the As-Is eCommerce System Technology Architecture:

- XYDirect
  - Small B2B customer (e.g. mom/pop store) order products from this site.
  - It sends checkout order in xml to XYShop to process, and XYShop send order number back to XYDirect, which checks order status by URL-link to XYShop.
  - XYShop communicate with SDAT to process order.

- XYShop
  - XYShop is developed based on 3rd party platform SDEM.
  - Allow an individual consumer to order physical, digital or consumer product.
  - XYShop send order to SDAT
  - SDAT,3rd vendor/system for pick-pack-ship, send data to XYShop via ftp/daily batch

- SMSB
  - Digital retailer (i.e. iTunes, Amazon) will call Tech OP or DD to order.

- EAI
  - Contains WebSphere application server, MQ, MB, DB2.
  - It interacts with Informatica through JMS implemented via MQ

- Number of integration structure links: 35.

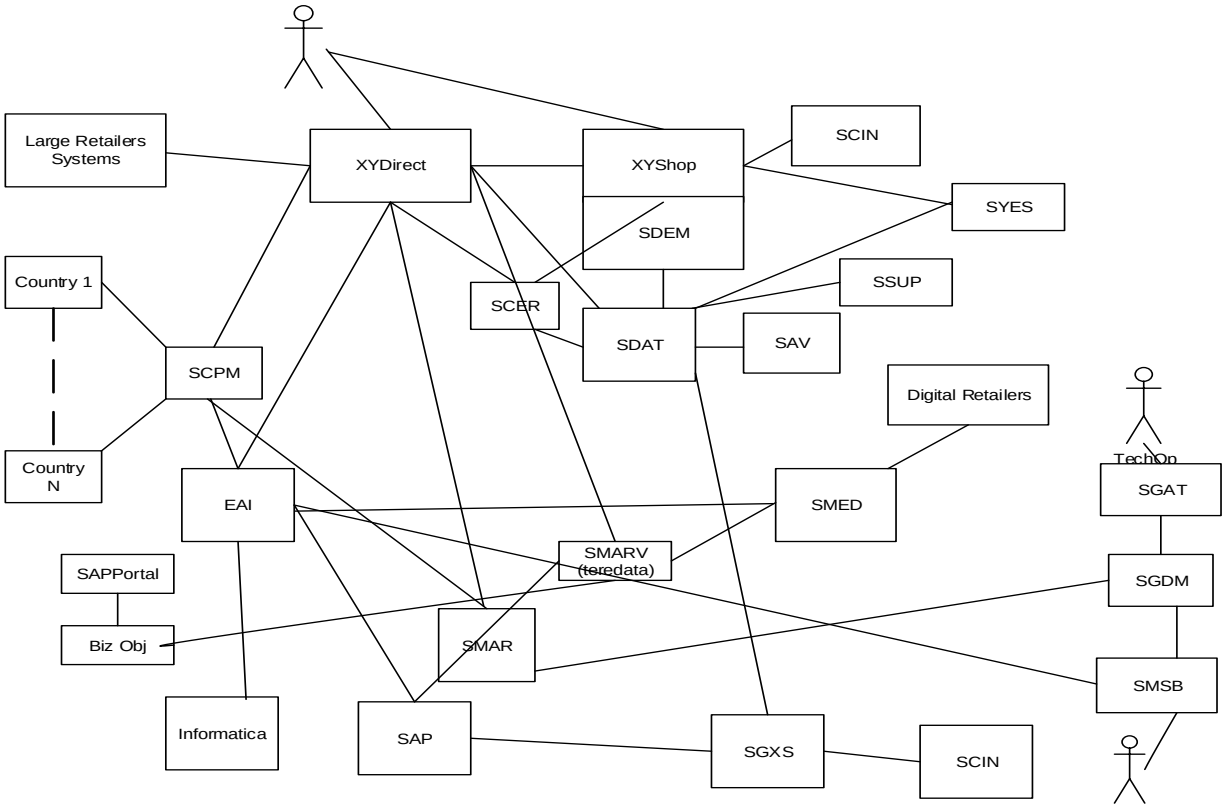


Figure (Use Case) 9 - As-Is eCommerce System Technology Architecture Overview Sample

5.3.4.2 *As-Is eCommerce Technology Architecture System Matrix*

For illustrative purpose, here is a part of the Technology Architecture Information Matrix, which lists major interfaces and the technology stack for each of the systems in the Figure (Use Case) 9.

System List	Functions	Interfaces	Tech Stack	Note
XYDirect	• B2B System for USA and other 21 countries • Transfer daily prod catalog to SDAT from SAP	1. Checkout order to XYShop in XML/http 2. Get order# from XYShop via http 3. Check order status via URL link to XYShop 4. Pub/sub EAI pattern to get prod catalog data from SAP hourly via EAI	• WebSphere AS • Oracle 10g, • Linux	• Oracle and Linux are in AOL data center • WSAS is in WB data center.
XYShop	B2C	1. Order data in XML to SDAT via https every 5min, batch 2. Request digital download to SCIN via http/WS call	Java, Oracle, JavaScript, SDEM	Use SDEM platform.

5.4 Modern To-Be Analysis

5.4.1 Biz Arch

5.4.1.1 *To-Be eCommerce Strategy*

After ESP team analyzed the eCommerce strategy, it identified gaps and recommend adding two new strategies, one for business, and one for technology. The following table is a partial list of the strategy.

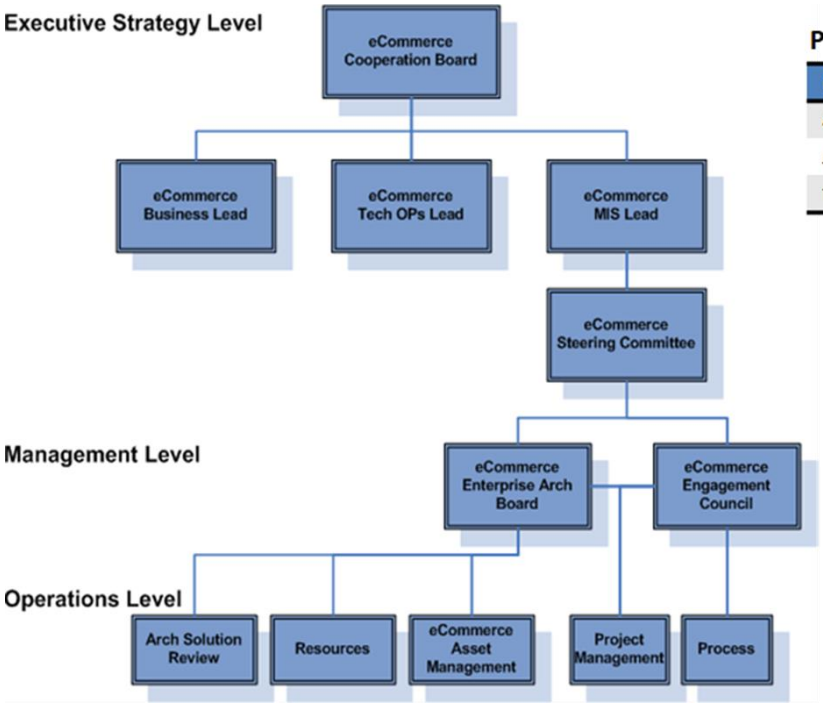
eCommerce Business Strategy	**eCommerce Technology Strategy**
• Flexibility • Direct to customers • Globalization • Marketing Intelligence • Appropriate ecommerce governance • eCommerce exec foundation(recommend)	• Agile technology architecture • Coordinated ecommerce system development effort cross IT groups • Appropriate technology governance • Build ecommerce tech capability(recommend)

5.4.1.2 *To-Be eCommerce Governance Model*

Due to the well-known pain point in eCommerce operation: lack of cooperation and governance across related eCommerce business units and teams, the ESP team designed a high-level eCommerce governance model (Figure5.10). Here is a partial view the model:

The To-Be eCommerce Governance Principles:

- A governance model is needed to effectively implement eCommerce
- eCommerce governance model is an enabler of eCommerce business agility
- Enable quick decision-making process across multiple divisions



Potential Participants List

Name	Board Position
A Jones	eCommerce Business Lead
J Thomas	eCommerce Tech Ops Lead
T Smith	eCommerce MIS Lead

Figure (Use Case) 10 - eCommerce Governance Model Overview Sample

Executive Strategy Level	MIS Management level	MIS Operational level
• Executive decision-making body • Alignment of IT to business goals and objectives	• Enterprise Architecture board supports executive's decision/strategy from technology perspective	• Architecture/solution review

5.4.1.3 *Significant Business Cases and Processes*

Due to the limited strategic planning project time, the ESP team identified, analyzed, and documented 11 significant To-Be business cases and processes [Figure (Use Case) 11]. Each of which is documented in a detailed use case document.

#	Name	MegaProcess
1	eCommerce Strategy UseCase B2C Digital	XYShop.com
6	eCommerce Strategy UseCase B2M– Marketing/Radio	XYDirect.com
7	eCommerce Strategy UseCase Digital B2B iTunes	Digital
11	eCommerce Strategy UseCase B2B MDM SDAT	MDM
Etc.	Etc.	Etc.

Figure (Use Case) 11 - Significant To-Be eCommerce Use Case List Sample

One is shown in the following section with abbreviated information.

5.4.1.3.1 eCommerce Strategy To-Be Use Case B2M

The Business to Marketing Process (B2M) describes the flow of transactions and data between systems because of the online acquisition of a XY Marketing Data by online consumers. This use case covers, at a high level, how the transaction is routed between systems and the various outcomes that can be reached.
If all validation points are satisfied, the transaction will be recorded, the order fulfilled, and the data made available to initiating system and ultimately the consumer.
If any validation rule fails, an exception will be generated to at least one exception category.

Use Case Diagram

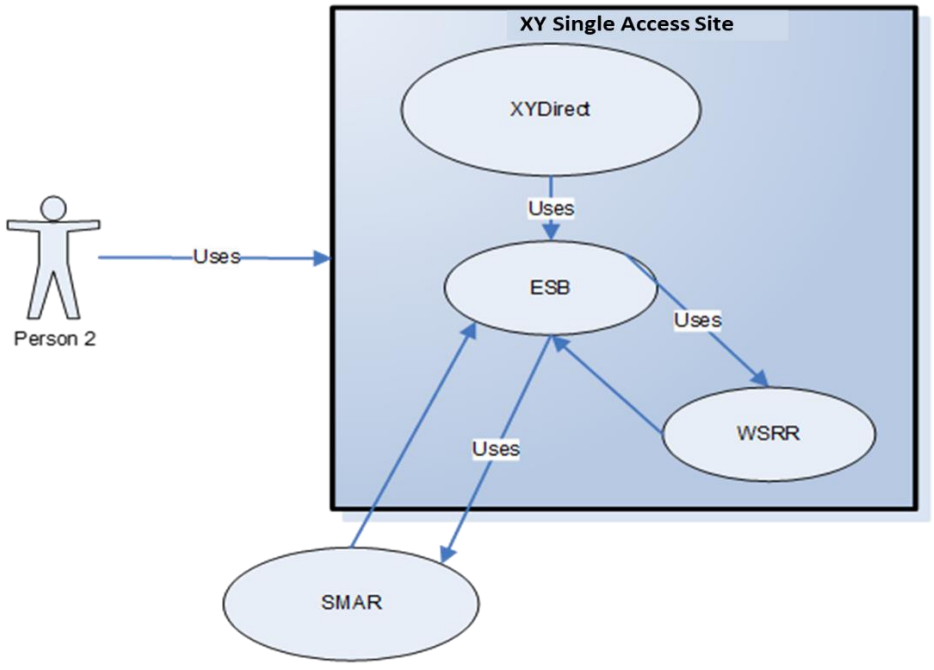


Figure (Use Case) 12 - B2M Use Case Diagram Sample

Process Flow Diagram

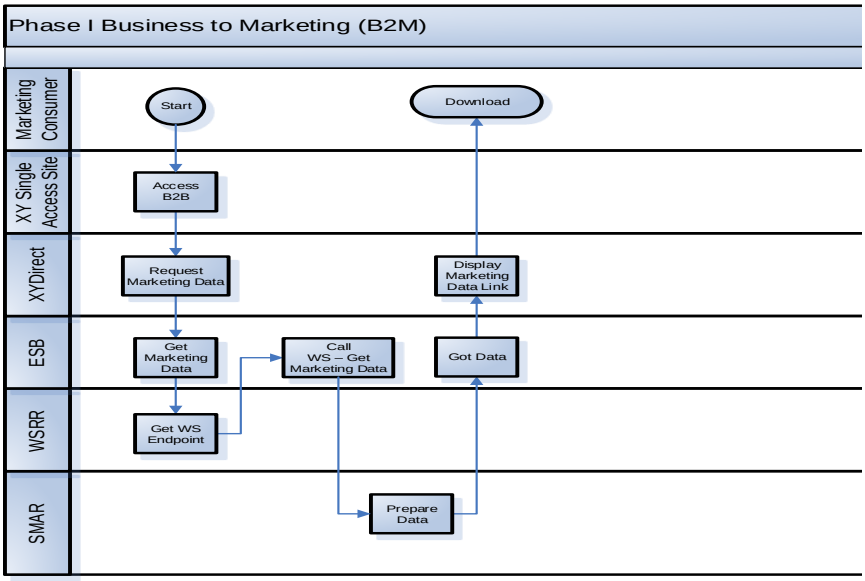


Figure (Use Case) 13 - B2M Process Flow Diagram Sample

5.4.2 Data Arch

As there was another team, the enterprise data architecture team, responsible for data architecture, such as LDM, PDM, etc., the ESP team focused on addressing a strategic challenge: Master Data Management. The following diagram is a high level To-Be MDM:

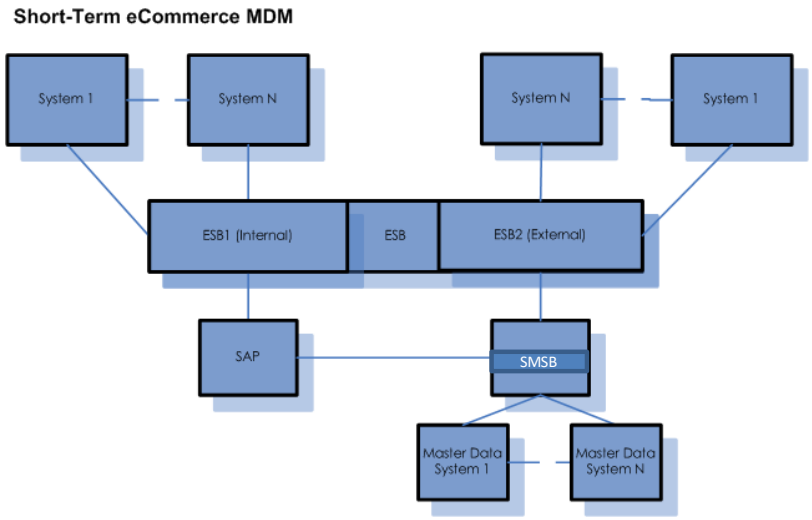


Figure (Use Case) 14 - To-Be eCommerce MDM Sample

MIS-oriented MDM solution	Issue Addressed	Benefit
• Keep current MDM solution using SAP to feed master data to MIS internal system via EAI/ESB • Enhance SMSB as a harmonized MDM solution for feeding master data to MIS external systems via ESB (external)	• Multiple systems provide master data to multiple users/systems (e.g., Amazon receives inconsistent data)	• Provide a single master data distribution access point for all external systems

5.4.3 Application Architecture

The ESP team created To-Be eCommerce Conceptual Architecture Overview Diagram Figure (Use Case) 15 below.

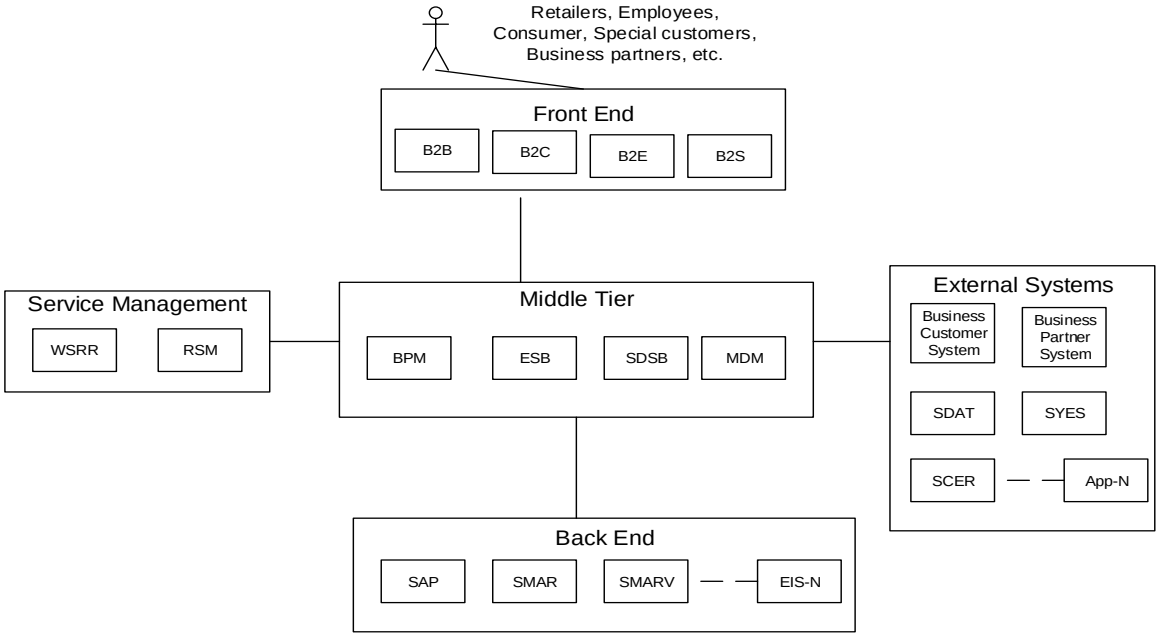


Figure (Use Case) 15 - To-Be eCommerce Conceptual Architecture Overview Diagram Sample

AOD Overview	Benefits

• Back End: Provide enterprise information and intelligence
• External Systems: Business partners' systems
• Service Management: Manage system services:
  ○ WSRR: Service management, service location transparency
  ○ RSM: Service performance monitoring and alerting, dependency mapping and root cause analysis
	• Better business operation support via runtime performance visualization and management
	• Cost saving and improved ROI via consolidated technologies/ platforms and shared assets
	• Single view of XY to the world via consolidated front end

	• Flexibility to create, distribute, update, and maintain master data across various systems

5.4.4 Tech Arch

The following diagram is a high level To-Be eCommerce technology architecture.

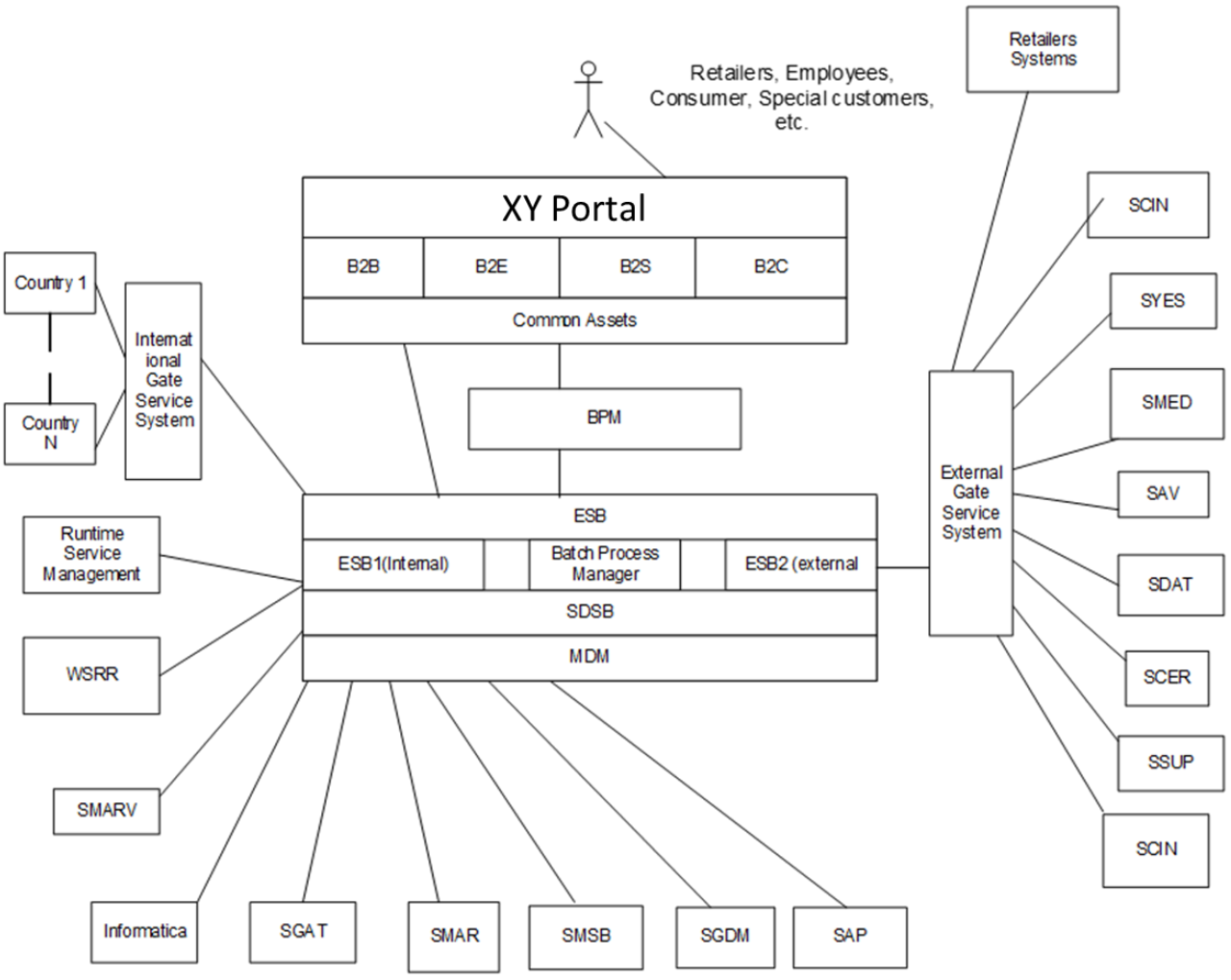


Figure (Use Case) 15 - To-Be eCommerce Technology Architecture Diagram Sample

For illustrative purpose, the following are some of the To-Be technology architecture details:

- Further development and enhancement on Front-end portal systems, Runtime Service Management, WSRR, BPM, Batch process management, ESB, SDSB and MDM.
- The front-end consolidated portal applications will maximize the reusability of shared common assets, be easier to maintain, and extended use with lower cost.
- For a system hosted in an international region that needs to communicate with any system hosted in USA, it will communicate with international gate service system, etc.
- For any external systems that will communicate with XY internal systems, they will communicate with external gate service system, etc.
- SGXS may be eventually merged to External Gate Service System, etc.
- Number of integration structure links
    - Comparable with As-Is structure: 18.
    - Non-comparable due to the added new systems: 6.

The following is part of the To-Be technology architecture info matrix.

System List	Functions	Interfaces	Tech Stack	Note
WSRR	Web service registry/repository	Interact with ESB to provide web service info dynamically	e.g. IBM WSRR, WSAS	Enhance/ Extend
RSM	Run-time service management	Interact with all systems providing services	e.g. progress software's Actional server	Enhance/ Extend
Internal ESB	Enterprise service bus for internal systems	Interact with all integrated internal systems via http/https/JMS/MQ, etc.	WSAS, WESB, MB, MQ, DB2, etc.	Enhance/ Extend
External ESB	Enterprise service bus for external systems	Interact with all integrated external systems via http/https/JMS/MQ, etc.	WSAS, WESB, MB, MQ, DB2, etc.	Enhance/ Extend
BPM	Business process management	• Interact with ecommerce front-end via http/https/JWM/WS/FC, etc. • Interact with ESB via http/https/JMS/MQ/WS/, etc.	e.g., Aqualogic BPMS	Enhance/ Extend

5.5 Strategic Planning

5.5.1 Impact Analysis

There are concurrently running projects within each related program area that will place additional demands on the same resources, which may have impacts on eCommerce strategic planning. Due to the project time constraints, the team focused on identifying those projects and analyzed the impact from the timeline, resource, and alignment perspectives. The team identified the program owners with projects scheduled for next year and analyzed their related projects.

- MIS Budgeting/Planning program including three projects
- MIS Product Lifecycle Management program including six projects
- MIS Supply Chain Optimization program including ten projects
- Vanguard Implementation
- MIS Sales Planning & Integration program including five projects
- MIS Master Data & Business Intelligence program including ten projects
- MIS eCommerce program including six projects

Two of them are listed here at a high level.

- MIS next year programs and owners

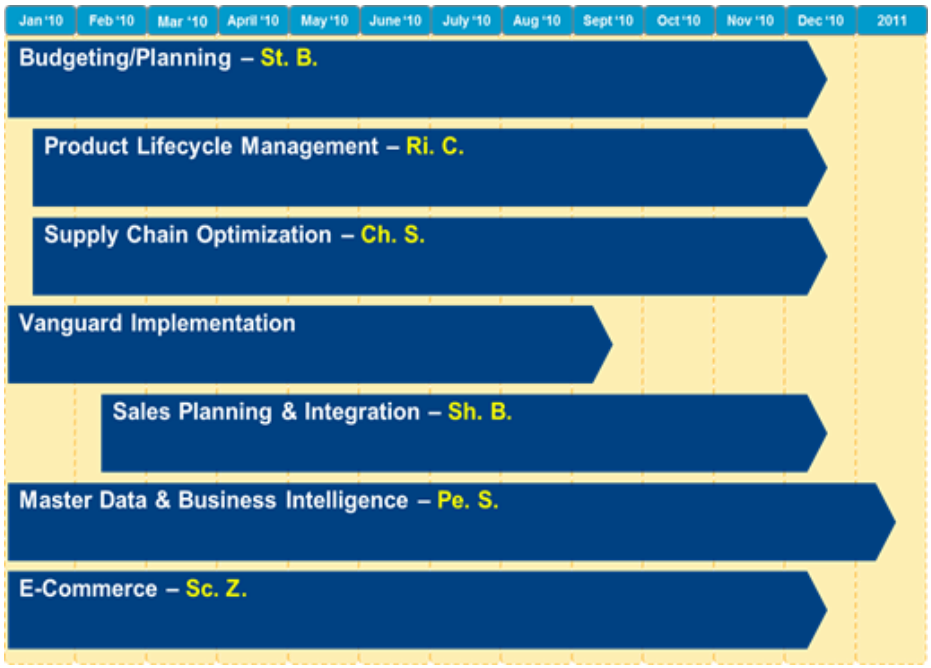
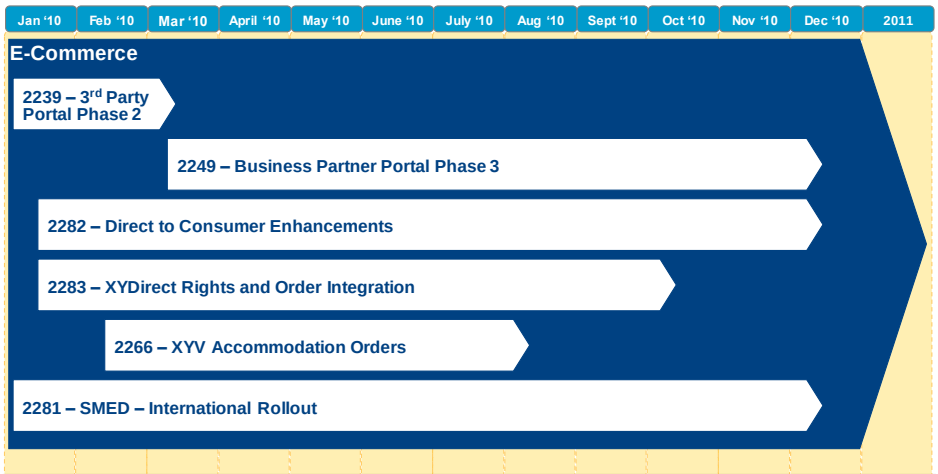


Figure (Use Case) 16 - MIS Next Year Programs

- MIS next year overview: eCommerce



Program	Project	Owner	Start Date	End Date	Effort (Hours)
E-Commerce	2239 – 3rd Party Portal Phase 2	I. W.	03/21/09	03/01/10	711
	2249 – Business Partner Portal Phase 3	I. W.	03/01/10	12/10/10	5,155
	2282 – Direct to Consumer Enhancements	S. Z.	01/10/10	12/10/10	19,796
	2283 – XYDirect Rights and Order Int.	S.Z.	01/10/10	10/09/10	5,430
	2266 – XY Accommodation Orders	S.Z.	02/10/10	08/09/10	6,344
	2281 – SMED – International Rollout	S.Z.	08/15/09	12/10/10	320,795

Figure (Use Case) 17 - MIS Next Year eCommerce Projects

- Next Year eCommerce Initiatives Alignment Assessment (partial for illustration)

Projects	eCommerce Strategic Alignment Assessment	eCommerce Strategic Value Assessment	Risks
2239 3rd Party Portal Phase 2 and 2249 Business Partner Portal Phase 3	• Aligns with the eCommerce front end portal strategy • Aligns with the front end consolidation of eCommerce sites • Aligns with the eCommerce Self Service Strategy	• Gaining experience with SAP portal front end development which is leverageable for future applications	• Is SAP the agreed portal vendor across all projects? This should align with front-end consolidation of the eCommerce sites • If not, what is the potential solution to consolidate portal applications regardless of the various portal vendors/platforms? • How to synchronize this portal project and overall eCommerce system infrastructure enhancement? (for example EAI enhancements to an ESB)
2282 Direct to Consumer Enhancements	• Aligns with the business strategy to generate more revenue from XYShop.com • Games integration will require improved data integration with marketing • Aligns with the eCommerce strategy Direct to Customer • Aligns with the eCommerce strategy Globalization	• Utilize the capabilities gained from this project in ESB and SMSB integration, and Master Data feeds for B2C project	• Due to budget constraints and/or timing, ESB and SMSB integration may not be included
Etc.	• Etc.	• Etc.	• Etc.

Figure (Use Case) 18 - MIS Next Year eCommerce Projects

5.5.2 Gap Analysis

The ESP team analyzed the information collected and identified gaps and opportunities into three categories: Strategic, Operational, and Technical. For illustrative purpose, here lists some of the gap and recommendation report.

- Strategic Level Gaps and Recommendation

#	Gap	Example	Recommendation	Priority
1	eCommerce: Agility/Flexibility and Faster to Market vs. lack of scalability, changeability, automation, interoperability, extendibility	Consumers need real-time data updates, but the current system may take days to complete changes	• SOI with ESB • Design and build eCommerce execution foundation	H
2	ROI vs. lack of systematic eCommerce asset management and reusability	Different groups/projects develop eCommerce systems with similar tech/solution	• Product line practice, service management, and asset management.	H
3	Etc.	Etc.	• Etc.	Etc.

- Organization and Operations Level Gaps and Recommendation

#	Gap	Example	Recommendation	Priority
1	No formal/consistent eCommerce governance in place		• Refer to eCommerce Cooperation Model	H
2	Some systems sharing significant common abilities are developed and maintained by different business divisions.	B2C under Tech OPs, and B2B under MIS	• Consolidate them under one division /group responsible for eCommerce front-end system technology	M
	Etc.	Etc.	• Etc.	Etc.

- Technical Level Gaps and Recommendation

#	Gap	Example	Recommendation	Priority
1	No formal eCommerce system usability / UI / user experience design & dev	XYShop.com does not have formal usability / UI design. Some consumers complain the user experience on the site is poor	• eCommerce front-end systems (e.g., XYShop, XYDirect, etc.) should have usability / UI / user experience design and development	H
2	No service registry/repository system in place		• Implement WSRR (e.g., IBM WSRR)	M
	Etc.	Etc.	Etc.	Etc.

Figure (Use Case) 19 – Gap Analysis and Recommendation

5.5.3 Roadmap

Based on the As-Is, To-Be, impact and gap-opportunity analysis, the ESP team decided to achieve the target state in three phases through two transition architecture states as Figure 17, 18 and 19 illustrated below. As the architecture overview diagrams show, there are some new (in red) and To-Be-enhanced (in yellow) components in each phase. For illustrative purpose, the following table is a part of the summary of each phase:

	Phase I – Foundation	Phase II - Portal/Self Service Automation	Phase III - User Experience Excellence/Service Clouds
Architecture	Infrastructure: • BPM, ESB, WSRR, RSM and Batch Process Manager • Open-Standard Services, e.g., Order management • Etc.	Infrastructure: • Enhancement and extension to achieve automated self-service • Open-Standard Services, e.g., Inventory management • Etc.	Infrastructure: • Enhancement and international extension • SaaS/Service Clouds • Open Standard Service, e.g., Shipment management

	<u>Front End System:</u> • Hard Consolidation • Aggregate front-end system links • Etc. <u>MDM</u>: • Initial MIS-oriented solution • SMSB consolidates master data • Etc.	<u>Front End System:</u> • Soft Consolidation with federated portal technology to aggregate front-end systems • Etc. <u>MDM</u>: • Add SDSB with MDM rule engine • Etc.	• Etc. <u>Front End System:</u> • Usability and user experience excellence • Automated process, etc. <u>MDM</u>: • Integration with XY enterprise MDM solution • Etc.
Benefit	• Scalable and extendable system infrastructure • Single master data distribution access point for all external systems • Etc.	• Cost saving and improved ROI via consolidated technologies/ platforms and shared assets • Single view of XY to the world via consolidated frond end • Etc.	• Flexibility to create, distribute, update and maintain master data across various systems • Improved sales and brand image • Etc.

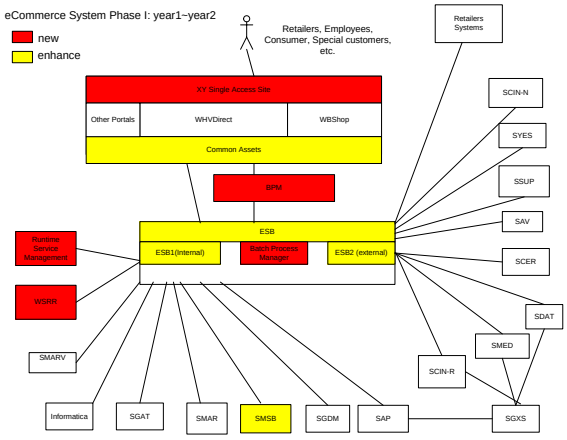


Figure (Use Case) 20 - Phase I Architecture Overview

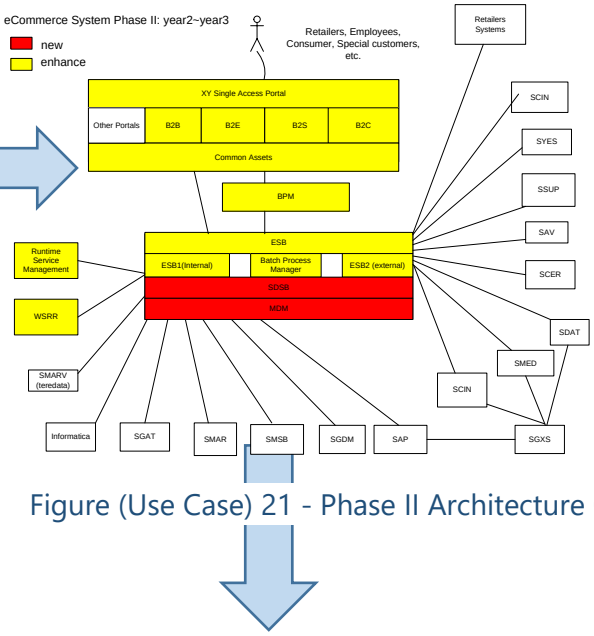


Figure (Use Case) 21 - Phase II Architecture Overview

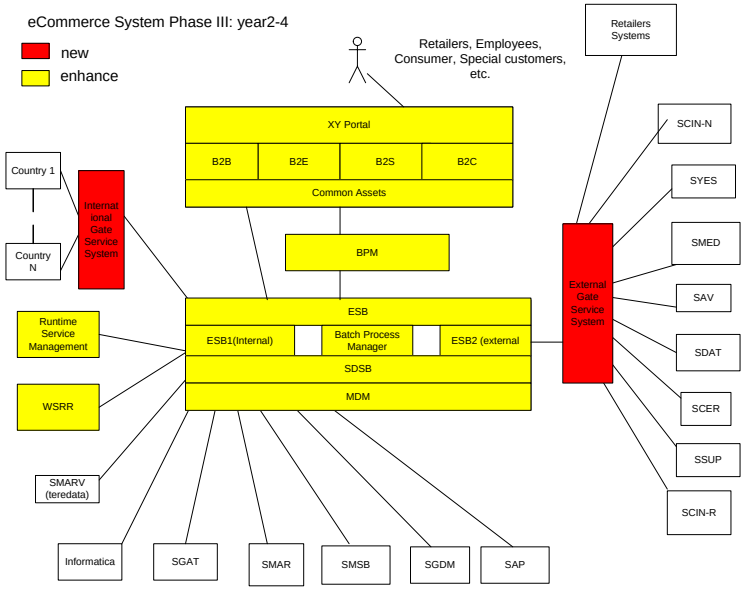
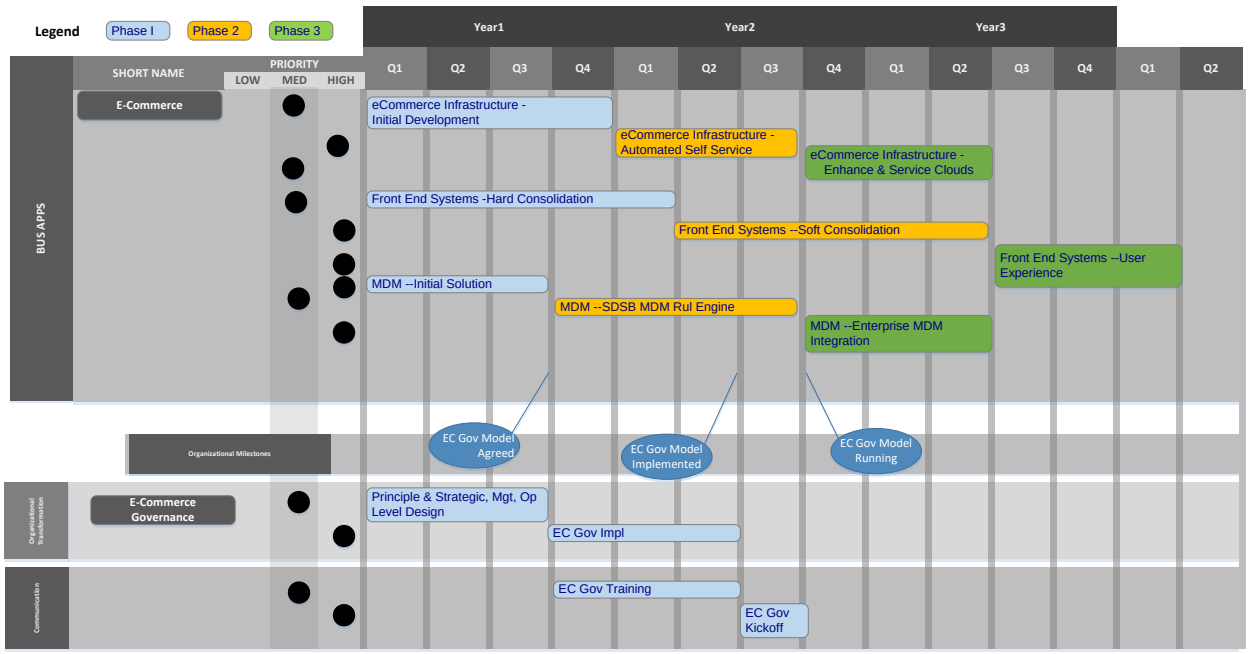


Figure (Use Case) 22 - Phase III Architecture Overview

5.5.4 Initial Implementation and Migration Plan

Based on the above Impact Analysis, Gap Analysis and Roadmap design, the ESP team designed the initial Implementation and Migration Plan. Figure (Use Case) 23 shows a partial Initial eCommerce Implementation and Migration Plan Overview diagram.



Phase	Value/Gap Addressed (for detail about gaps addressed by each phase, refer to Appendix-#-slide#)
I	• Scalable and extendable system infrastructure • Single master data distribution access point for all external systems • Etc.
II	• Cost savings and improved ROI via consolidated technologies/ platforms and shared assets • Single view of XY to the world via consolidated front end • Etc.
III	• Flexibility to create, distribute, update and maintain master data across various systems • Improved sales and brand image through user experience excellence • Etc.
Gov Model	• Systematic development cooperation approach enabling "fast to market" • Etc.

Figure (Use Case) 23 - Initial eCommerce Implementation and Migration Plan Overview

5.6 Next Steps

Finally, the ESP team listed the next steps to execute the eCommerce strategic plan.

- Design and implement the eCommerce Governance model
- Define Projects:
  - Create Project Plans
  - Determine Budgets
  - Calculate ROIs for Business Case
- Confirm Timelines and Obtain Necessary Approvals

6 Appendix

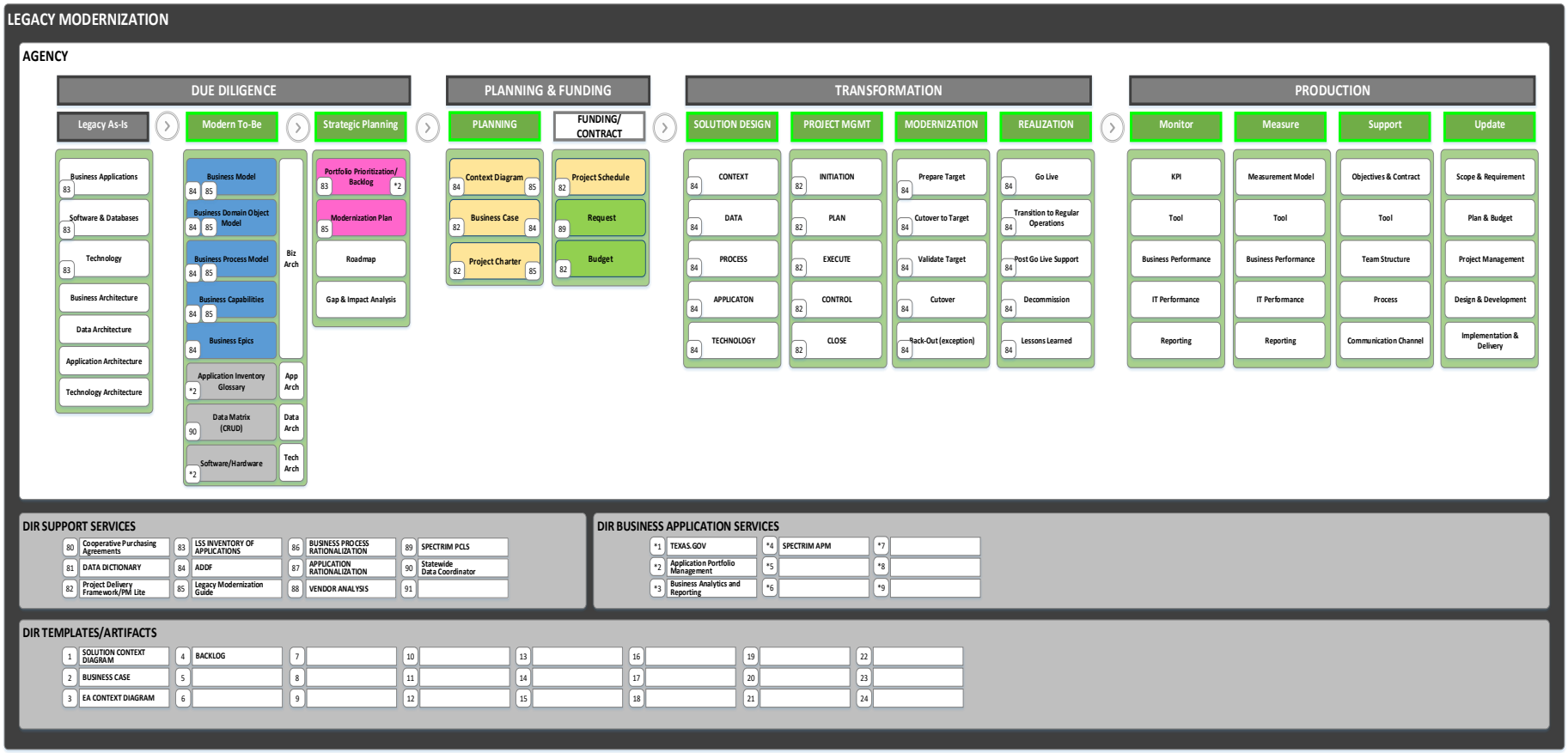
6.1 Example Responsibility Matrix

Role	Compliance Control Document	Responsibilities	Participant(s)
Business Sponsors		▪ Ultimate decision-makers and tiebreakers ▪ Provide project oversight and guidance	
Business Integration Leadership Team (BILT)	▪ System Accreditation Report	▪ **Accredit the system to Go Live** ▪ Helps identify and remove project barriers. ▪ Resolve conflicts and issues. ▪ Provide direction to the Project Manager. ▪ Review and approve project deliverables.	
Integration Project Manager	▪ Project Plan	▪ Manages project in accordance to the project plan ▪ Serves as liaison to the BILT ▪ Receive guidance from BILT ▪ Supervises consultants ▪ Supervise vendor(s) ▪ Provide overall project direction ▪ Direct/lead team, business users and taxpayers toward project objectives ▪ Handle problem resolution ▪ Manages the project budget	
Quality Assurance and Integration (QA&I) Management Team	▪ Defect Report ▪ Business Application Interconnection Diagram	▪ Define the Solution Configurations and Go Live State ▪ Complete Systems Integration ▪ Executes Product Testing ▪ Executes Interface Testing ▪ Executes Business Scenario Testing ▪ Executes E2E Scenario Testing ▪ Executes System Testing ▪ Executes Regression Testing ▪ Executes Load/ Stress Testing ▪ Executes Performance Testing ▪ Executed OTS Integration ▪ Hand-off of QA tools to the business. ▪ Defect Reporting	

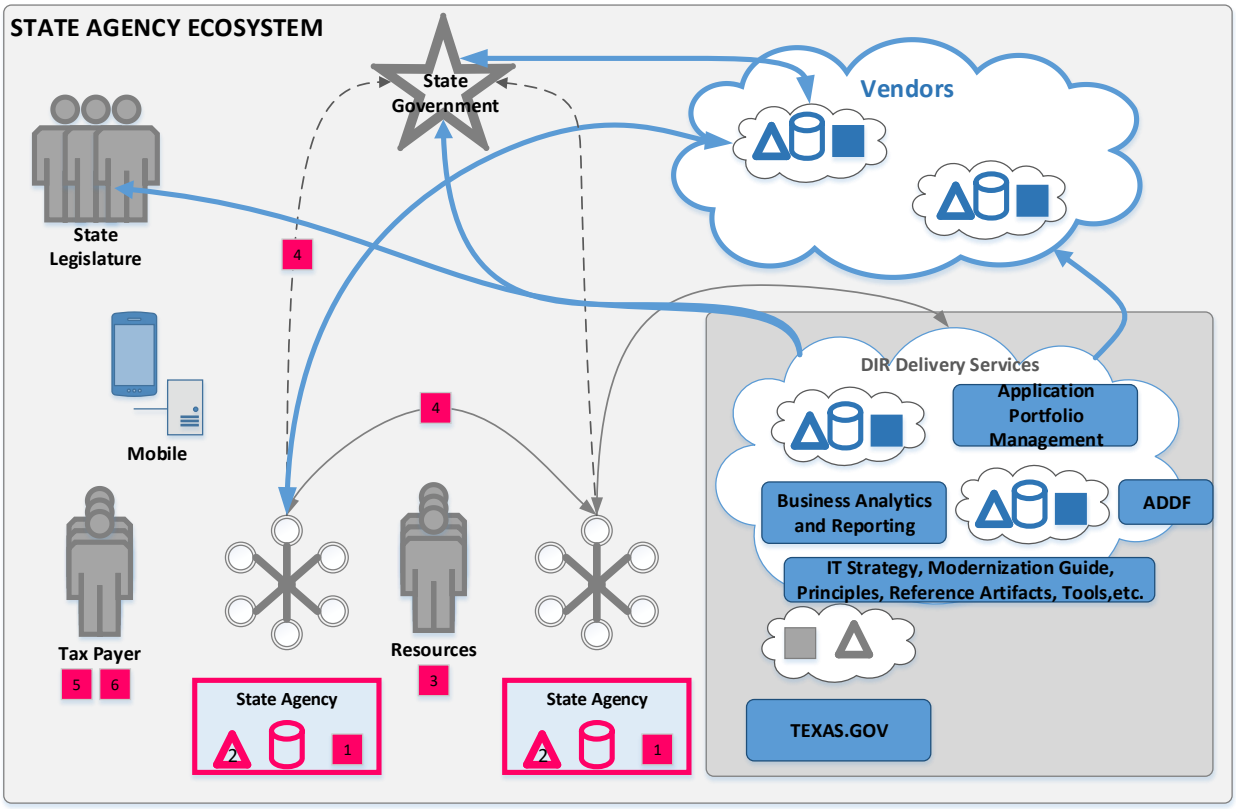
Role	Compliance Control Document	Responsibilities	Participant(s)
Vendor Relationship Manager	▪ Operational Readiness Checklist (ORC)	▪ Reviews Vendor Support Documentation to ensure supportability. ▪ Review Consultant Support Documentation to ensure supportability.	
Customer Relationship Manager	▪ Communication Plan	▪ Plan and Execute Communication Plan.	
Change Management Team	▪ Service Management Manual	▪ Hand-off of Release Control to Standard Change Management.	
Security Compliance Team	▪ ORC	▪ Vulnerability Testing ▪ Penetration Testing	
System Management Team	▪ Technical/ System Performance Assessment ▪ System Availability Assessment	▪ System Performance Assessment ▪ System Availability Assessment	
Subject Matter Expert (SME)	▪ Full Parallel Operations Business Scenario ▪ User Acceptance & System Performance/ Stability requirements ▪ Functional Validation Assessment ▪ Operational Readiness Checklist (ORC)	▪ Understand the user needs and business processes of their area ▪ Act as consumer advocate in representing their area ▪ Training of Users & Support Staff ▪ Communicate project goals, status and progress throughout the project to personnel in their area ▪ Creates or helps create work products ▪ Coordinates participation of work groups, individuals and stakeholders ▪ Provide knowledge and recommendations ▪ Assure quality of products that will meet the project goals and objectives ▪ Identify risks and issues and help in resolutions ▪ 1000 Hour Availability Project ▪ System Switch Over	

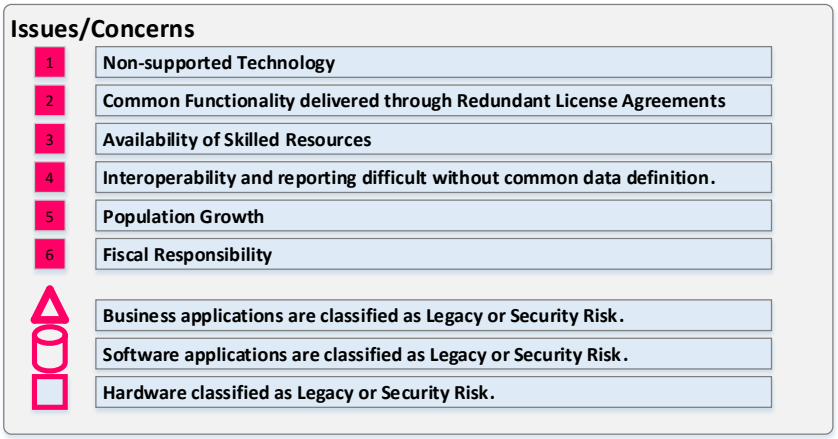
Role	Compliance Control Document	Responsibilities	Participant(s)
		▪ User Testing and Defect Identification	
Technical Support Team	▪ Operational Readiness Checklist (ORC)	▪ Review Vendor Support Documentation to ensure supportability. ▪ Review Consultant Support Documentation to ensure supportability. ▪ Supportability Assessment ▪ Maintainability Assessment	
BCP Team	▪ Disaster Recovery Plan ▪ Business Continuity Plan ▪ Data Backup Plan Testing and Revision Plan ▪ Operational Readiness Checklist (ORC)	▪ Disaster Recovery ▪ Business Continuity ▪ Data Backup ▪ Testing and Revision	
Modernization Planning Manager	▪ Modernization Checklist	▪ Modernization Charter Owner ▪ Coach/Mentor for Modernization Process and Participant Readiness ▪ Manages and certifies Due Diligence and Planning & Funding stages ▪ Artifact Management	
Migration Team Project Manager	▪ Migration Checklist	▪ Plan and Execute Modernization to Go Live ▪ Business Application Outage Planning and Scheduling	

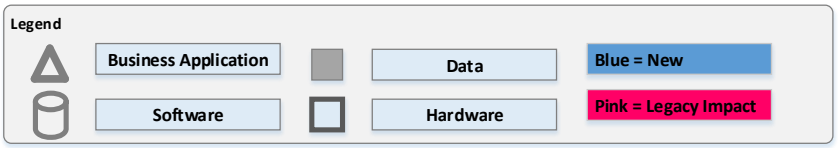
6.2 Phases of Legacy Modernization



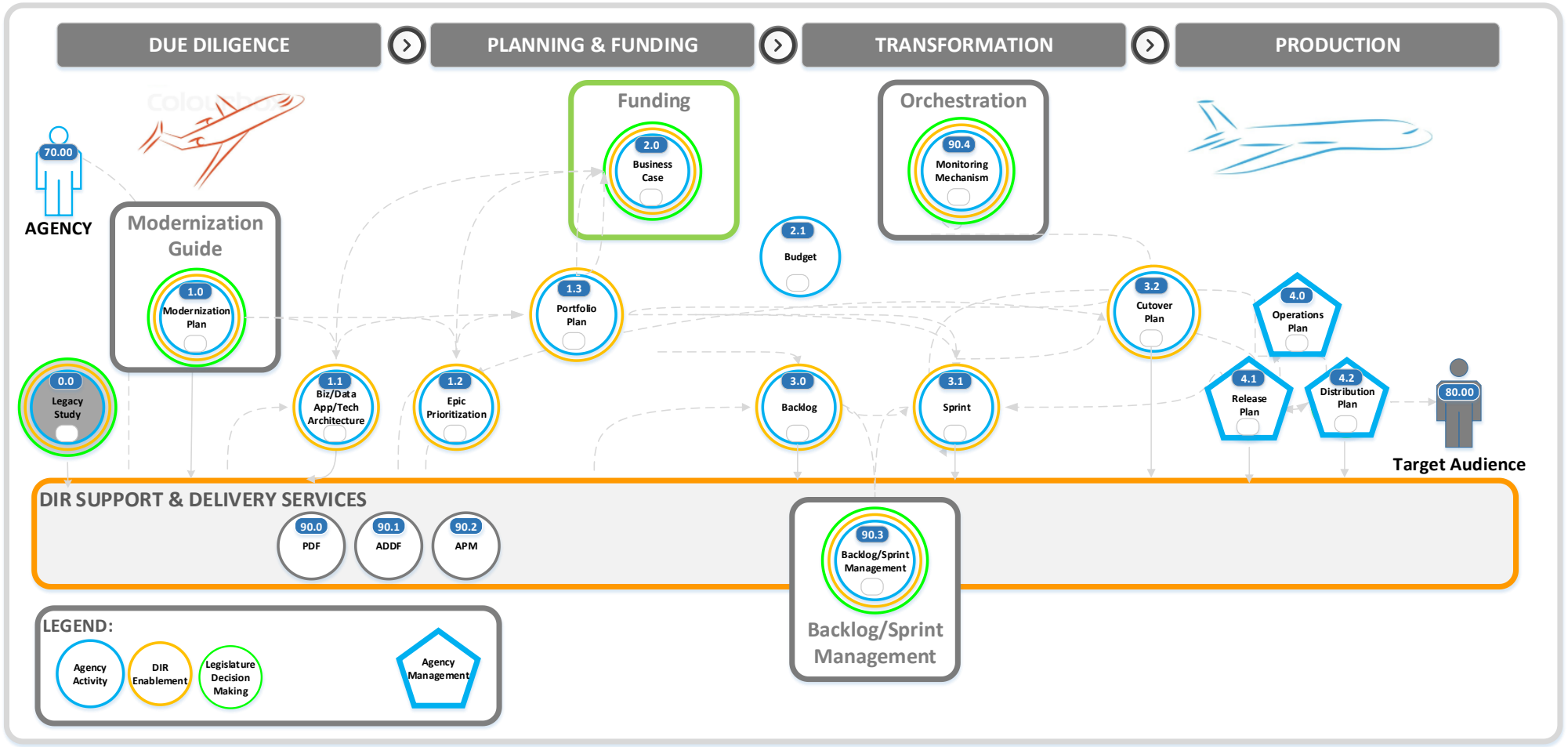
6.3 State Agency Ecosystem





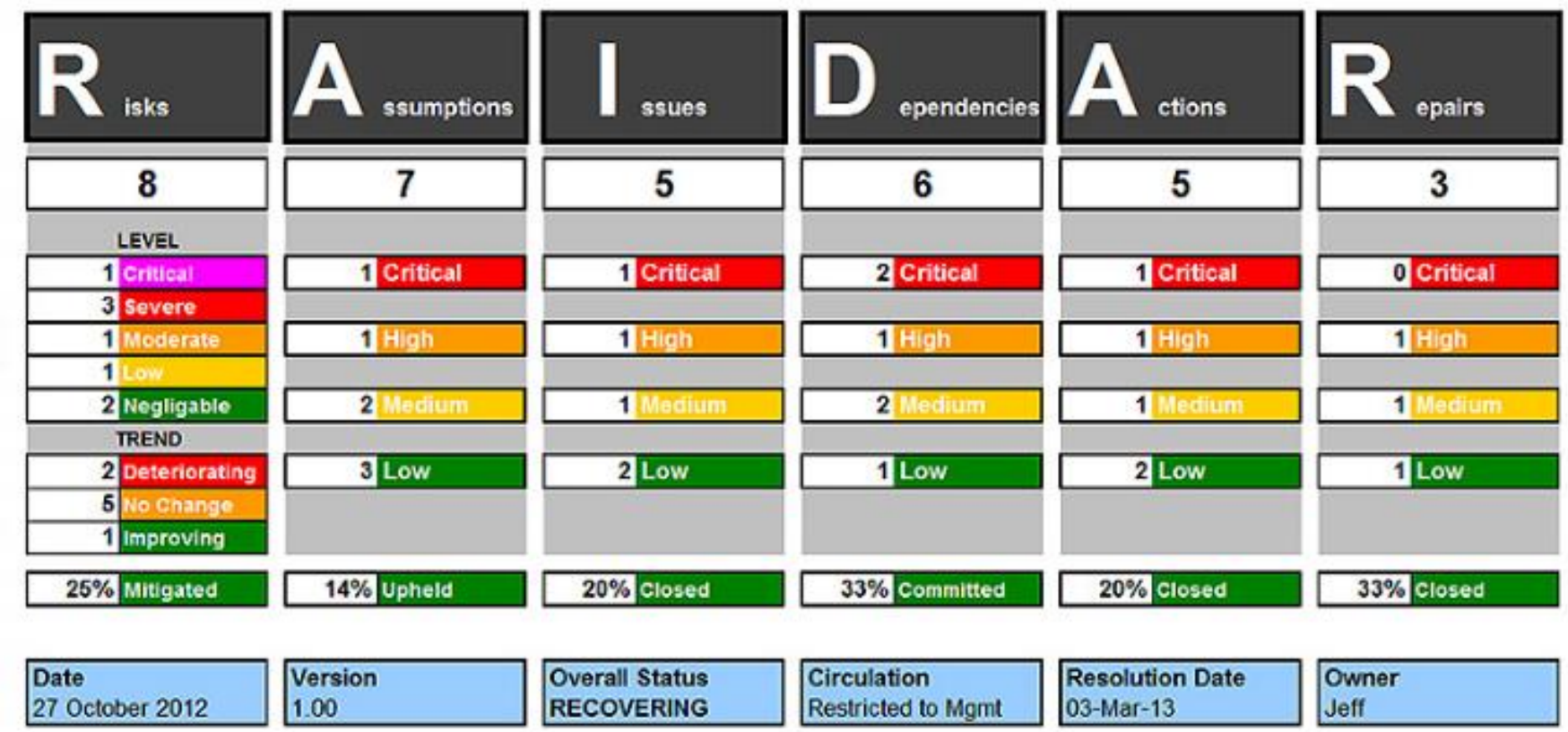


6.4 Modernization Charter Program Flow Overview Example

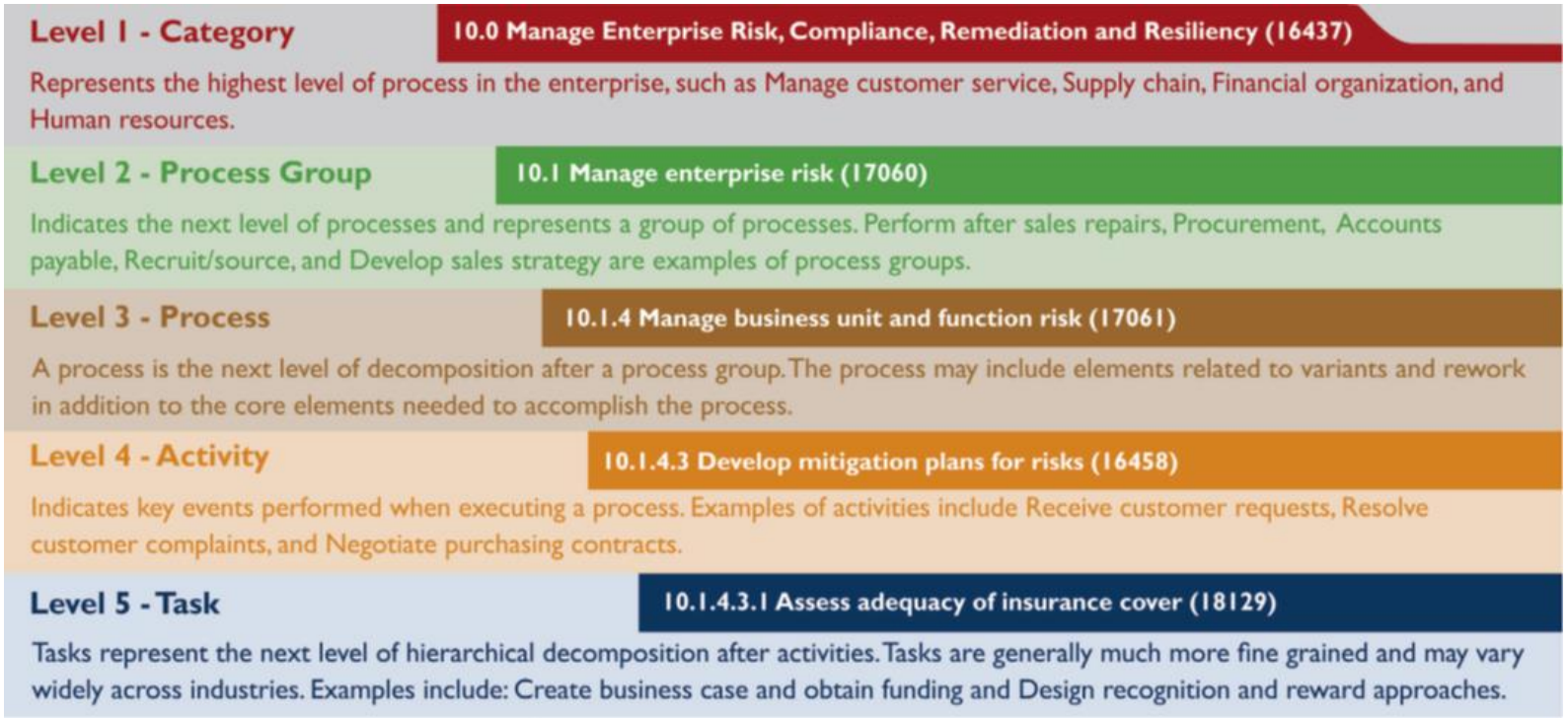


6.5 Legacy Modernization Progress Dashboard

This diagram depicts an example of multi-year Modernization Progress dashboard. Users can leverage this depiction as a visual status dashboard for monitoring of the journey from Vapor to Vision Realization. An example of what this dashboard could look like is the following.



6.6 APQC Process Classification Framework (PCF)



As one enterprise, the Texas government with about 120 agencies may internally use APQC Process Classification Framework (PCF) for classifying and defining processes in Texas government across agencies. The usage aligns with the service term of PCF.

6.7 Business Application Portfolio Model

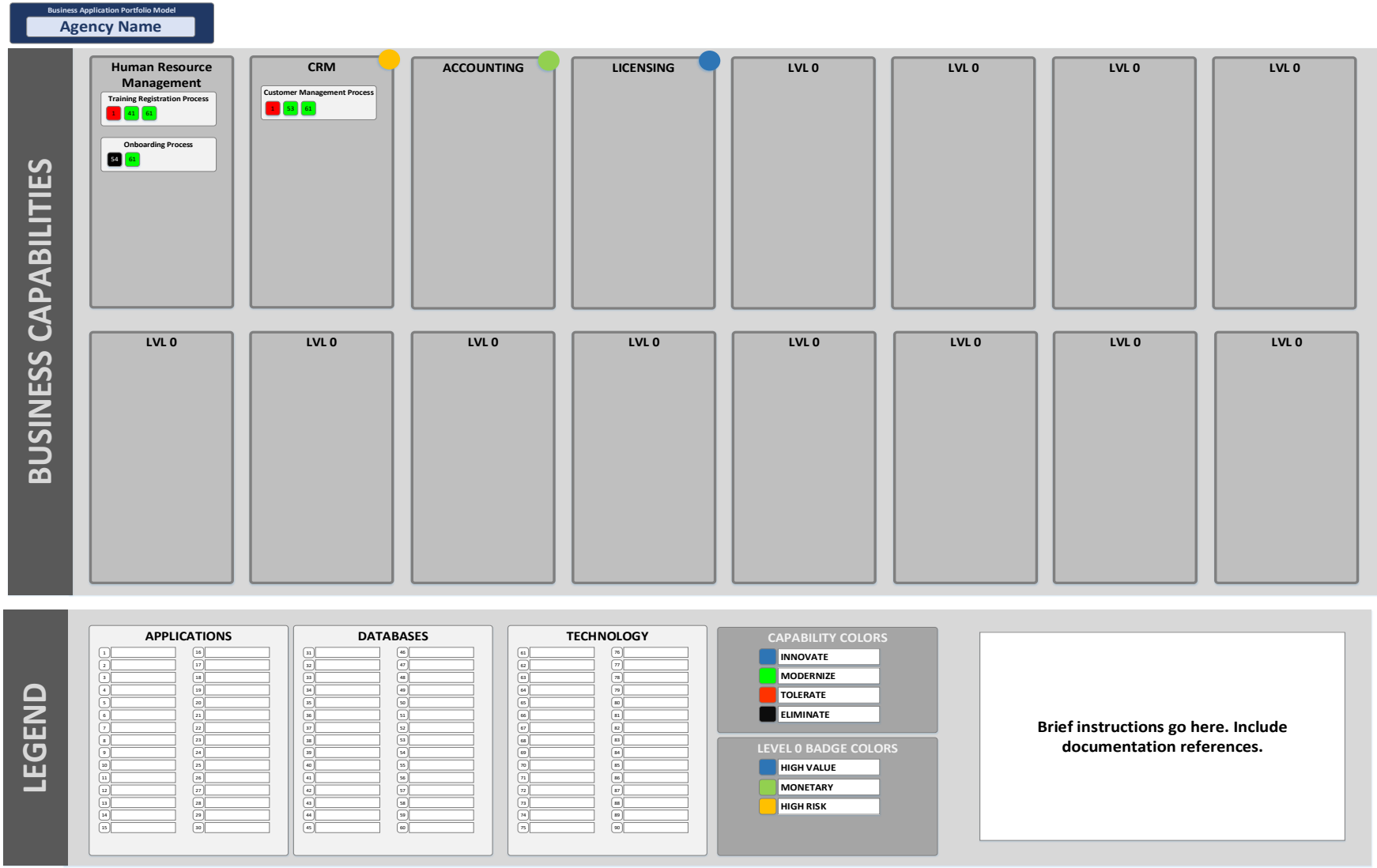
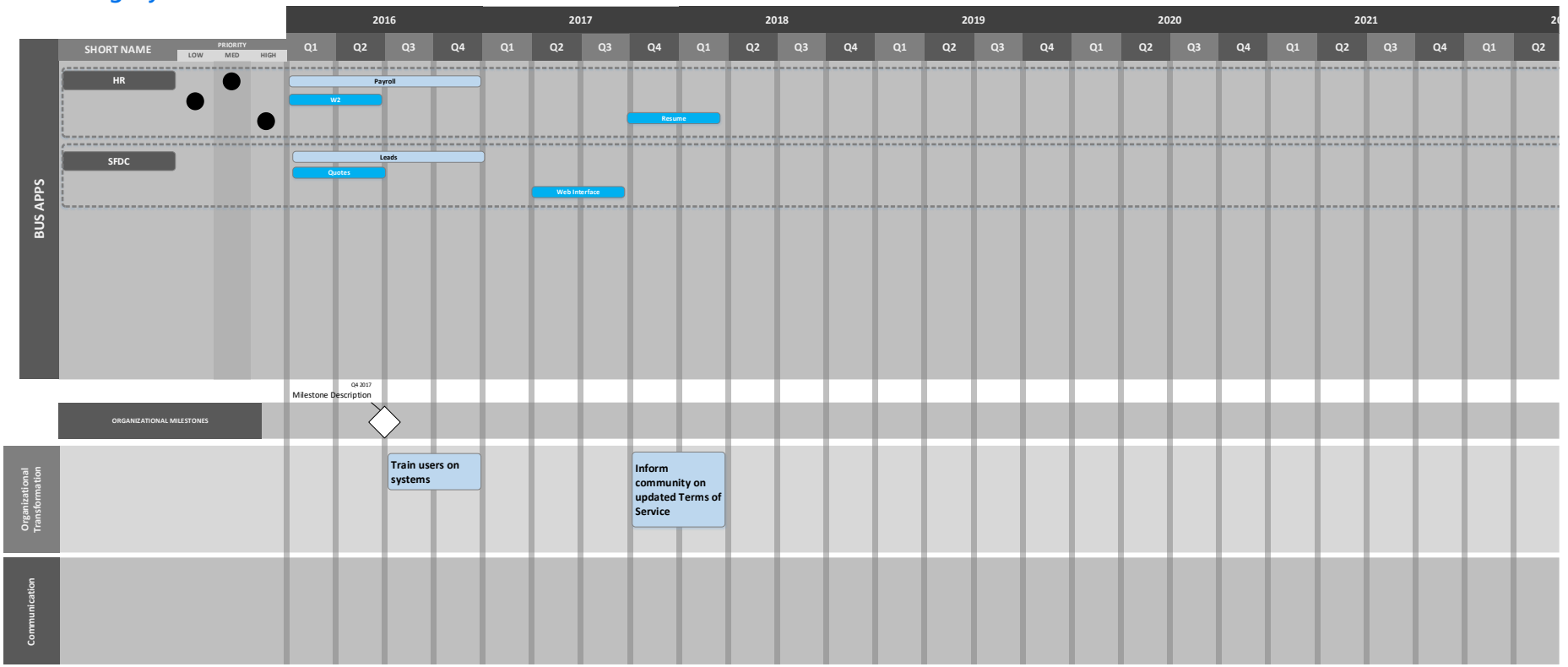


Figure #19 at LM Guide.doc

6.8 Legacy Modernization Plan Overview



6.9 Recommendations for expansions to the guide

The following are suggested for DIR to consider as part of the Modernization Strategy effort:

- **Strategic Level**
  - To fully address the stakeholders' concern on the LM and achieve the expected strategic value, DIR should lead and support the LM from the following two strategic levels
    - Catch-up: to enable an agency to modernize its business and systems to catch up the current-state of business and technology with stable emerging technologies.
    - Lead-to-Future: to enable an agency to innovate and transform itself systematically through utilizing emerging technologies and new winning-business-models constructively to lead its industry to the future
- **Tactical Level**
  - To provide some guidelines, principles, reference artifacts, tools, techniques, etc. to help an agency to execute LM program efficiently, such as,
    - **LM Guide**
      - Orchestration Mechanism for Monitoring "agency flights"
    - **Mechanism and Dashboard**
      - Provides at a glance insight to LM progress
    - **Agile Backlog and Sprint Management System**
      - Cloud-based tool like "rally" for Agencies to manage their Modernization Activities.
      - Business Architecture Framework: Business oriented construct for cross-agency alignment of business capabilities.
      - Application Portfolio Dependencies Map: At an agency level, a model depicting business critical capabilities, enabling applications, and high-level inter-dependencies – (As-Is and To-Be states)
- **Practice and Core Competence Level**
  - To initiate and develop strategic Enterprise Architecture practice to fundamentally improve enterprise-wide business-IT aligned execution capability and operation efficiency and effectiveness, so that an agency's LM program can constructively utilize DIR-enabled enterprise architecture assets to systematically improve its modernization performance in both catching-up modern-state and leading-to-future through innovation and transformation.

- For example,
  - **Enterprise Architecture Practice Frameworks**
    a. Comprehensive enterprise (business and technology) oriented architecture for Agencies to align business and technology capabilities.
    b. Enterprise Reference Architecture Framework
       i. To organize the artifacts across multiple-level and multiple-domain to enable various stakeholders (who have various interests) to understand the overall enterprise business, technology, and each other's point of views, and align their activities with each other organically.
    c. Enterprise Agile Framework
       i. To enable a balanced and collaborative agile project and program execution across an enterprise to achieve enterprise level agility.
    d. Enterprise Architecture Assets Management Framework
       i. For efficient and effective asset development, maintenance, reusability, agility, and better ROI.
    e. DIR Enterprise Architect Engagement Model
       i. To enable enterprise architect systematically to engage with projects and/or business units' operation in an efficient and effective way so that all business units or projects can perform holistically to achieve their local and short-term objectives while balancing and aligning with enterprise overall strategy and objectives.
    f. Enterprise Architecture Practice Measurement Model
       i. To enable an open and transparent measurement system to systematically measure and report the performance of an enterprise architecture practice in alignment with business values stakeholders expect.
    g. Enterprise Architecture Practice Maturity Model
       i. To enable a company to assess the maturity level of its enterprise architecture practice so that it can identify a roadmap to improve its enterprise architecture practice constructively, which will enable a company to improve its core capability of execution, innovation, and transformation.
    h. Enterprise Architecture Practice Budget Model
       i. To enable an enterprise architecture practice leader to systematically estimate and plan an annual budget for the enterprise architecture practice, fitting-in-the-context of the enterprise.
    i. Business-IT Alignment Framework
       i. To systematically align business and IT in daily operation across the enterprise and agencies, and from corporate to business unit to

project levels through constructive enterprise architecture practice enabled organic business IT alignment structure.

6.10 Support Contacts

DIR staff is committed to providing support to agencies during the LM journey. DIR staff will strive to answer all inquiries related to this LM Guide within two business days. IRMs are encouraged to submit inquiries as necessary. Please submit inquiries via e-mail to jennifer.buaas@dir.texas.gov. This support will be part of an overall DIR engagement model, which will be aligned with DIR's relationship management process, for supporting an agency's LM program. Refer to Section 1.5.4 Service Deliverables and Expectations of DIR.

Name	Contact
Robert Benejam	robert.benejam@dir.texas.gov
John Hoffman	john.hoffman@dir.texas.gov

6.11 External Credits

Topic	Source	URL
Business Process	APQC	https://www.apqc.org/ THE APQC PROCESS CLASSIFICATION FRAMEWORK® (PCF) was developed by non-profit APQC, a global resource for benchmarking and best practices, and its member companies as an open standard to facilitate improvement through process management and benchmarking, regardless of industry, size, or geography. The PCF organizes operating and management processes into 13 enterprise level categories, including process groups and over 1,000 processes and associated activities. To download the full PCF or industry-specific versions of the PCF as well as associated measures and benchmarking, visit www.apqc.org/pcf.
Business Analysis	IIBA	http://www.iiba.org/BABOK-Guide.aspx
Business Model	Business Model Canvas	https://www.businessmodelsinc.com/en/inspiration/tools/business-model-canvas
Technology Operations	ITIL	https://www.axelos.com/certifications/itil-service-management
Enterprise Delivery	Scaled Agile Framework	http://www.scaledagileframework.com/
Enterprise Architecture	TOGAF	http://www.opengroup.org/subjectareas/enterprise/togaf
Enterprise Architecture	Zachman	https://www.zachman.com/
Business Capability and Business Process	LeanIX	https://www.leanix.net/en/blog/business-capabilities-vs-business-processes-whats-the-difference

6.12 Definitions, Acronyms, Abbreviations

For a complete list see the DIR Glossary and Acronym list found on the TEXAS.GOV website.

Term	Definition
Abstraction	A method by which a conceptual big picture model can be presented on a single page to show subordinate relationships between elements that are relevant to a purpose.
ADDF	Application Development Decision Framework
Application Portfolio Management (APM)	Application Portfolio Management's goal is to describe the inventory of business applications and the resources (e.g., money, staff time, and infrastructure) required to provide operational support of those applications over their lifetime. APM is closely related to governance and how an agency ensures that business applications are aligned with agency business needs, enterprise architecture (alignment of people, processes, technology), and tracking of effective metrics to measure the value proposition of applications relative to each other within an agency (or state) portfolio. APM should guide the investment decisions for a business application's lifecycle, particularly balancing between adding features, maintaining infrastructure currency, and modernizing the platform. Effective implementation of APM is an indicator of an organization's information technology services maturity and its ability to respond to business requirements.
Business Application	A Business Application name is the high-level label used by an agency business and IT organization to easily refer a group of functions or automated processes provided by one or more systems to accomplish the specific business needs of the agency. A Business Application is typically a combination of integrated hardware and software (including data and applications), internally developed custom systems, commercial off the shelf (COTS) applications, and/or customized third-party systems.
Business Capability	A business capability is a particular ability or capacity that a business may possess or exchange to achieve a specific purpose or outcome. A capability describes what the business does (outcomes and service levels) that creates value for customers; for example, pay employee or ship product. A business capability abstracts and encapsulates the people, process/procedures, technology, and information into the essential building blocks needed to facilitate performance improvement and redesign analysis.
Capability	A service that characterizes a business-valued activity, supported by business processes, applications, data and technology.

Functional and Non-Functional	Functional requirements are largely expressed in user stories and in features and capabilities. This is where most of the work occurs to build systems that deliver value to the user. Nonfunctional Requirements define system attributes such as security, reliability, performance, maintainability, scalability, and usability.

Legacy System	A legacy system is any system that meets at least one of the criteria of obsolete or inefficient hardware or software technology.
	• Obsolete: any hardware or software technology that is:
	  ○ no longer supported by the manufacturer or third-party vendor community
	  ○ no longer able to provide or perform future system improvements or corrections
	  ○ currently associated with premium or exceptional support charges from the manufacturer or vendor community for support, or
	  ○ lacking the qualified pool of support knowledge, viable spare parts, or commercially viable channels for acquiring necessary skills to continue operations with a reasonable degree of certainty.

SME	Subject Matter Expert
Unified Modeling Language [UML]	A general-purpose, developmental, modeling language in the field of software engineering, that is intended to provide a standard way to visualize the design of a system. *Wikipedia contributors. "Unified Modeling Language." Wikipedia, The Free Encyclopedia. Wikipedia, The Free Encyclopedia, 15 Dec. 2016. Web. 15 Dec. 2016.*
Use Case	A list of actions or event steps, typically defining the interactions between a role (known as an actor in Unified Modeling Language [UML]) and a system, to achieve a goal. *Wikipedia contributors. "Use case." Wikipedia, The Free Encyclopedia. Wikipedia, The Free Encyclopedia, 1 Dec. 2016. Web. 1 Dec. 2016.*

6.13 Artifact Checklist

The *Artifact Checklist* is a job aid that summarizes, clarifies, and prioritizes the use of the outputs listed in Section 3 of the Legacy Modernization Guide. The figure below is a snippet from the first page of the actual Artifact Checklist.

Title: Legacy Modernization Artifact Checklist

LM Stage	Phase	Artifact	Artifact Purpose	Tips for Creating Artifact
NOTE: When developing your agency's Legacy Modernization artifacts, choose a level of detail (i.e., Level 0, 1, 2, or 3) based on the context, the audience, the purpose, and the architect's or designer's own experience. Similarly, your decision to include an artifact from this checklist in your modernization strategy will depend on the value you believe the artifact will add to the quality and overall success of your modernization project. Some artifacts are labeled with an asterisk (*) and are color shaded to indicate that DIR highly recommends creating and including the artifact, at least as a Level-0 artifact, in your Modernization Due Diligence documentation.				
INITIATE		Role & Responsibility Matrix*	Defines the roles that will be needed to conduct the Legacy Modernization Due Diligence stage and identifies the people who will be serving in each of the roles.	A comprehensive list of sample roles is included in Section 6.1 of the LM Guide. An agency can tailor the roles according to the agency's existing organizational structure. At minimum, include and assign the lead role of "Modernization Planning Manager" to your Modernization Core Team.
		RACI Chart*	Defines the level of involvement and communications expectations by roles	Sample RACI charts are shown in Sections 3.2.4 and 5.2.4 of the LM Guide. Your RACI Chart should include all the roles you define in your Responsibility Matrix, plus any additional stakeholders that will need to be consulted or kept informed.
		Legacy Modernization Charter*	Outlines Vision & Goals for the Modernization, and the Scope of the Due Diligence and the Planning & Funding stages.	Refer to Section 3.2 Legacy Modernization Chart within the LM Guide for the elements that should be included in your Legacy Modernization Charter.
DUE DILIGENCE	Legacy: As-Is	**Business Architecture (As-Is)**		
		1. Business Model Canvas*	Provides high-level items-of-interest to be used in subsequent phases.	Identifies: Key Partners Key Activities; Key Resources; Value Propositions; Customer Relationships; Channels; Customer Segments; Cost Structure; Revenue Streams. See Amazon Kindle example in Section 3.3.2.1.6 of the LM Guide. Best created in a facilitated group session using sticky notes on a white-board canvas.
		2. Business Capabilities Analysis*	Defines the businesses' ability to produce outcomes and service levels that create customer value.	Use value stream information from the Business Model Canvas to identify business capabilities. Reference the ADDF section "Developing Capability Model" for additional in-depth guidance on identifying business capabilities.
		3. Business Process Analysis*	Describes how the business performs the given capability to deliver the desired outcome.	Use the results from the Business Capabilities analysis to identify the business processes that implement the business capabilities.
		4. Business Domain Model*	Identifies major business entities and their relationships consumed by business activities and actors.	Domain Models come in many forms, which vary on the balance between technical and organizational needs. Focus on what information output and input is needed from business partners and activities. That information can be obtained from business capability and process analyses.
		5. Use Case Model	Provides a model for how different types of users interact with the system.	Identify the actors (i.e. user types and systems) and their interaction with the system being addressed. The use case model should be iteratively developed with the business owners to validate a common understanding of the

6.14 Business Model Canvas Template

Key Partners

1. Who are our key partners?
2. Who are our key suppliers?
3. Which key resources are we acquiring from customers?
4. Which key activities do partners perform?

Key Activities

1. Which key activities do our value propositions require?
2. Our Distribution Channels?
3. Our Customer Relationships?
4. Our Revenue Streams?

Key Resources

1. What Key Resources do our Value Propositions require?
2. Our Distribution Channels?
3. Customer Relationships?
4. Revenue Streams?

Value Propositions

1. What value do we deliver to this customer?
2. Which problems are we helping this customer resolve?
3. What bundle of products/services are we offering to this customer segment?

Customer Relationship

1. What type of relationship does this customer segment require us to make and maintain with them?
2. Which ones have we already established?
3. How are they integrated with the rest of our business model?
4. How costly are they?

Channels

1. Through which channels do our customer segments want to be reached?
2. How are we reaching them now?
3. How are our channels integrated?
4. Which ones work best?
5. Which ones are most cost-effective?
6. How are we integrating them with customer routines?

Customer Segments

1. For whom are we creating value?
2. Who are our most important customers?

Cost Structure

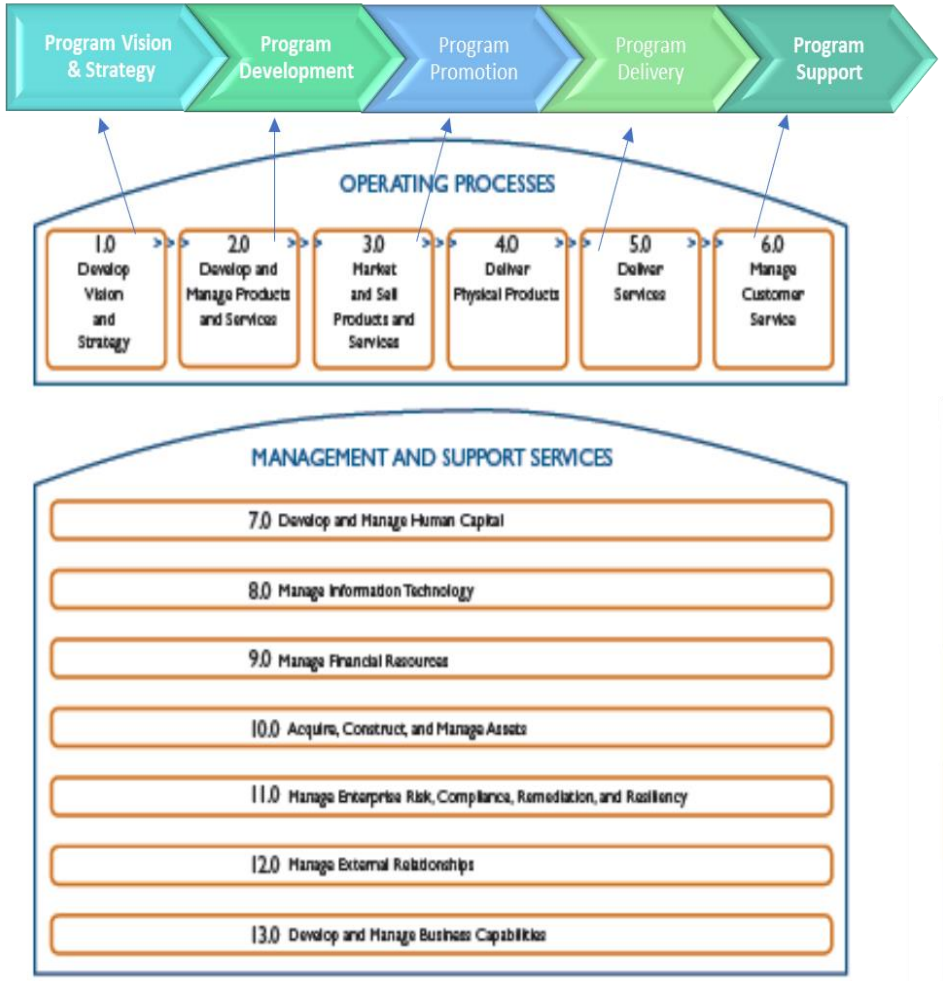
1. What are the most important costs inherent to our business model?
2. Which key resources are most expensive?
3. Which key activities are most expensive?

Revenue / Funding Streams

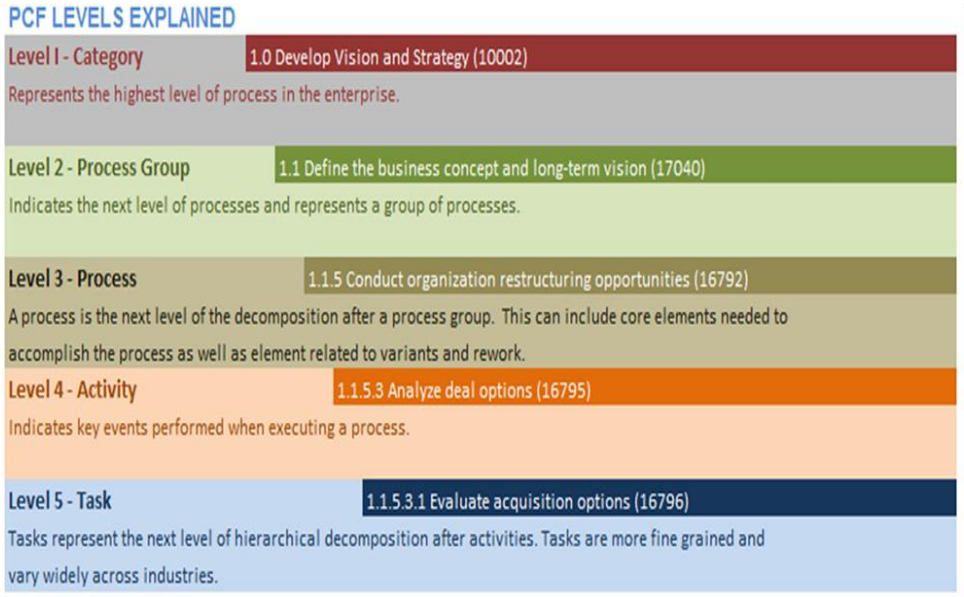
1. For what value is this customer really willing to pay?
2. How are they currently paying?
3. How much does each revenue stream contribute to overall revenue?

Legend

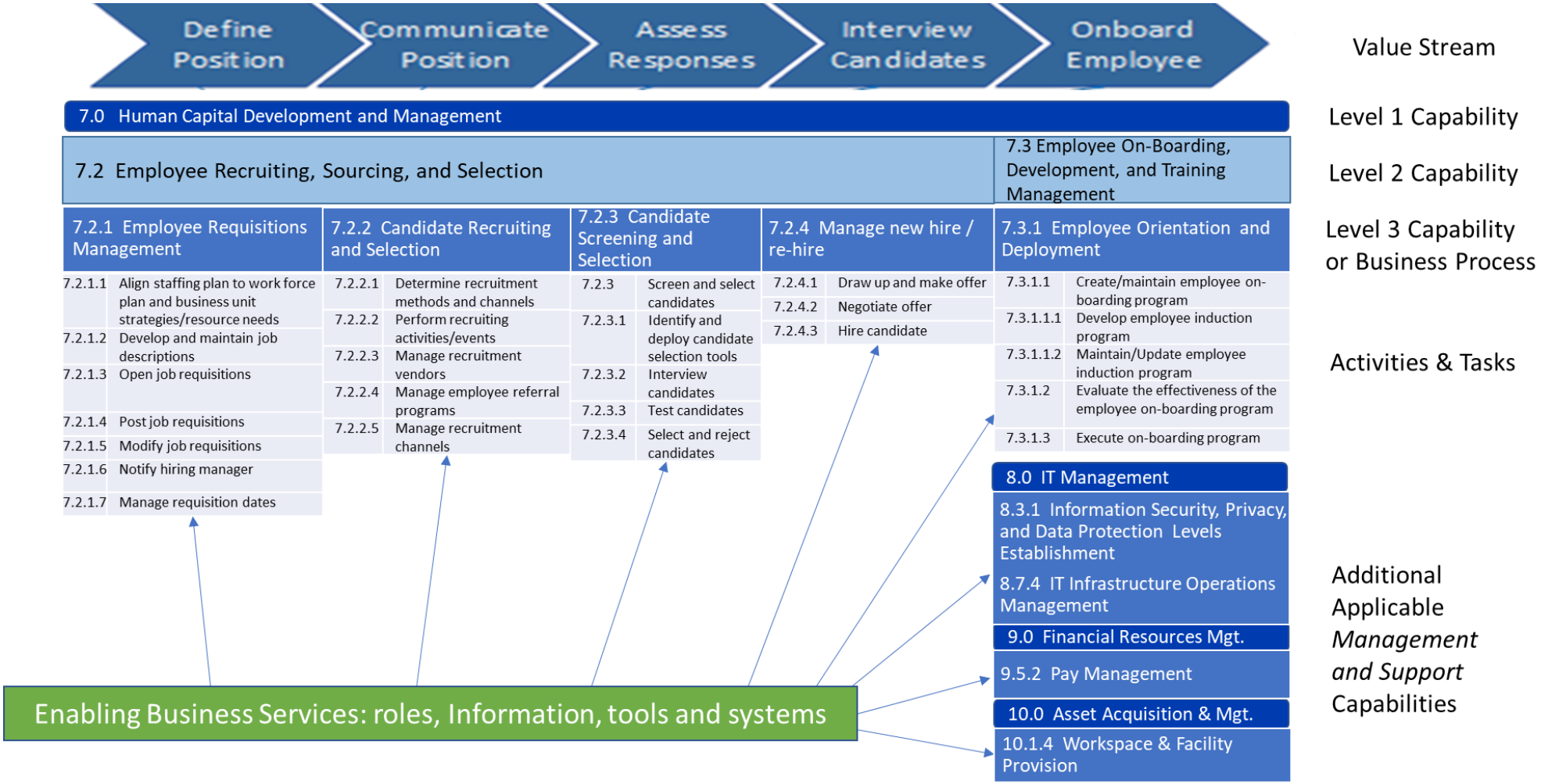
6.15 APQC PCF – Operating Processes / Management & Support Services



The PCF Operating Processes (categories 1.0 to 6.0) are similar to the process stages of the highest-level values streams of various types of businesses. Within state government, there likely will be a greater emphasis on "service" delivery (5.0) rather than on "physical product" delivery (4.0). Government units might also restate "Market and Sell" (3.0) to be the "Promotion" of products and services. Within each of the 13 APQC PCF classifications, each high-level 1 process category will be deconstructed into up to four lower levels, as defined below.



6.16 Value Stream Deconstruction Example Using APQC PCF-Derived Capabilities



6.17 Value Stream and Capabilities Heat Map Example

The following diagram represents a program value stream and the high-level supporting capabilities applicable to each stage of the value stream. The capabilities represented on this heat map were derived from the APQC Process Classification Framework (PCF) as Level 1 capabilities. The capabilities for each stage have been rated by their effectiveness, resulting in a Red, Yellow, and Green *Capabilities Heat Map*. This heat map is referenced at the end of the Value Stream Deconstruction section.